

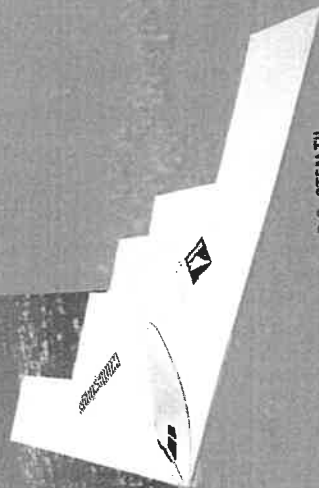
White Wings EXCELLENT PAPER AIRPLANES

RESERVED EDITION
15 SELECT MODELS

®

DESIGNED BY
DR. Y. NINOMIYA

EXCELLENT
15 PAPER AIRPLANES
FUTURE OF FLIGHT SERIES



B-2 STEALTH

Assembly Kit

Dr. Yasuaki Ninomiya was awarded the Grand Prize in both the light time and distance divisions at the First International Paper Airplane Contest (Pacific Basin Division) in San Francisco in 1967 and served as a judge in the Second Great International Paper Airplane Contest in Seattle in 1985.

Whitewings®

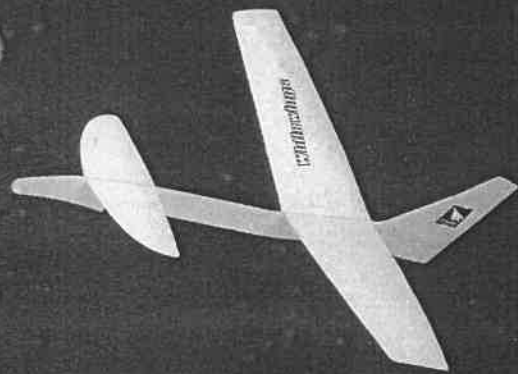
ASSEMBLY INSTRUCTIONS

FLIGHT INSTRUCTIONS

GUIDELINE FOR WHITEWINGS COMPETITION

INTRODUCTION TO PAPER PLANE DESIGN

HOW TO BUILD "WHITEWINGS"



FUTURE OF FLIGHT SERIES

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HOW TO BUILD "WHITEWINGS"

Racer 524 Blue Jay
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TAILLESS PLANE
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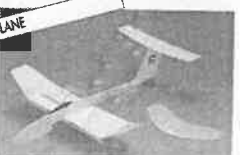
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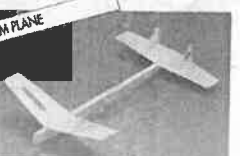
RING WING CANARD
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ASYMMETRICAL WING PLANE
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Whitewings

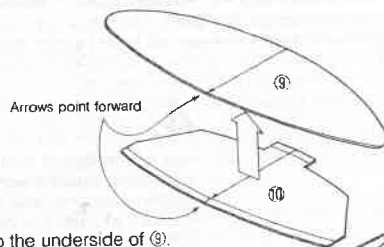
Racer 525 Sparrow

GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

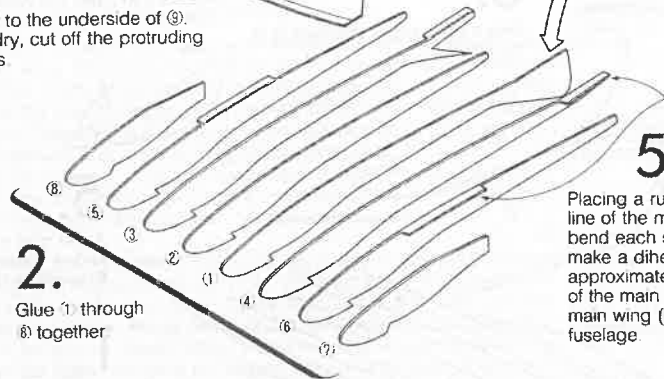
3.

Glue 10 to the underside of (9).
When dry, cut off the protruding portions.



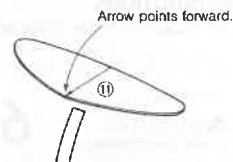
2.

Glue 1 through 8 together.



4.

Glue the horizontal stabilizer (11) to the fuselage.



1.

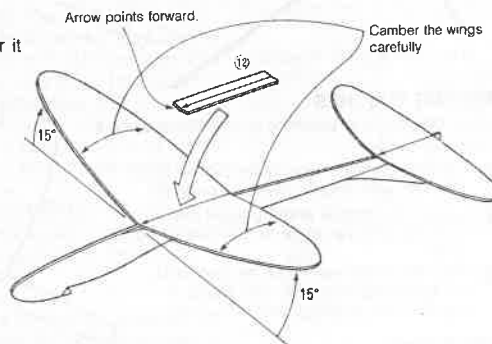
Fold all tabs outward.

5.

Placing a ruler along the center line of the main wing (9+10), bend each side up individually to make a dihedral angle of approximately 15° for both sides of the main wing. Then, glue the main wing (9+10) firmly to the fuselage.

FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly.
- 6. Camber the main wing slightly with your fingers.
- 7. Using the dihedral angle gauge, make sure the dihedral angle for the main wing is 15°.
- 8. Fold 12 up slightly along both sides of its center line and glue it onto the center of the main wing.
- 9. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.



TEST FLIGHT

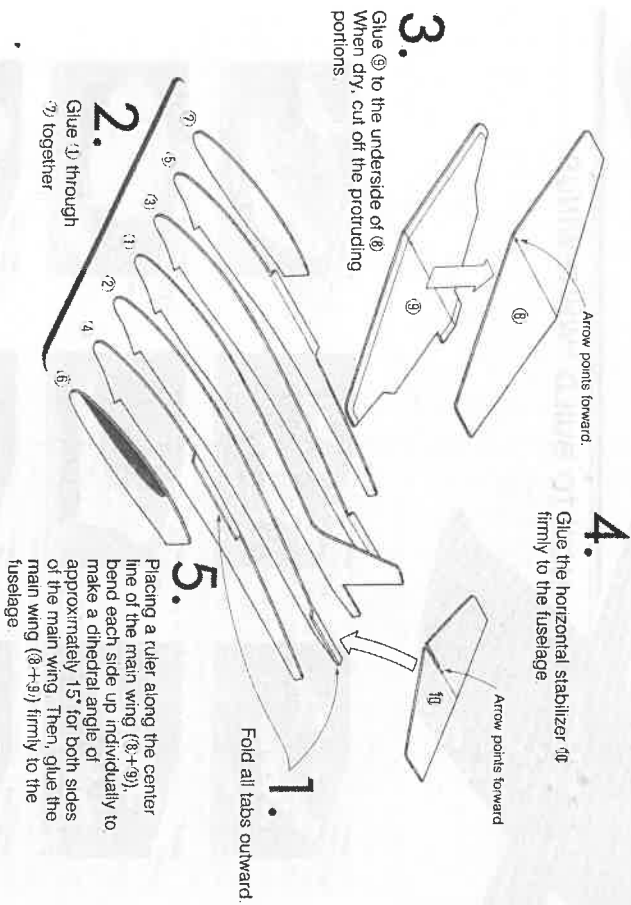
- Test fly the plane according to the Test Flight instructions for Regular Planes on pages 11 to 14.

WhiteWings

Racer 524 Blue Jay

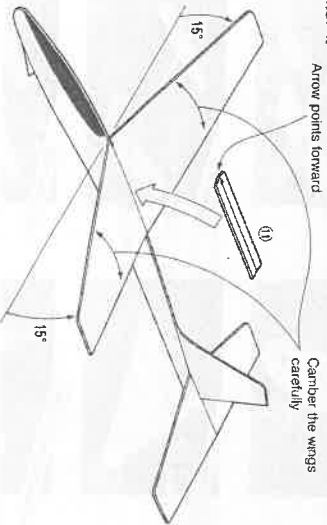
GLUING INSTRUCTIONS

Glue the parts together in the order indicated



FINISHING TOUCHES

1. Give the finishing touches to the plane after it dries thoroughly.
2. Camber the main wing slightly with your fingers.
3. Using the dihedral angle gauge, make sure the dihedral angle of the main wing is 15°.
4. Fold (11) up slightly along both sides of its center line and glue it onto the center of the main wing.
5. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

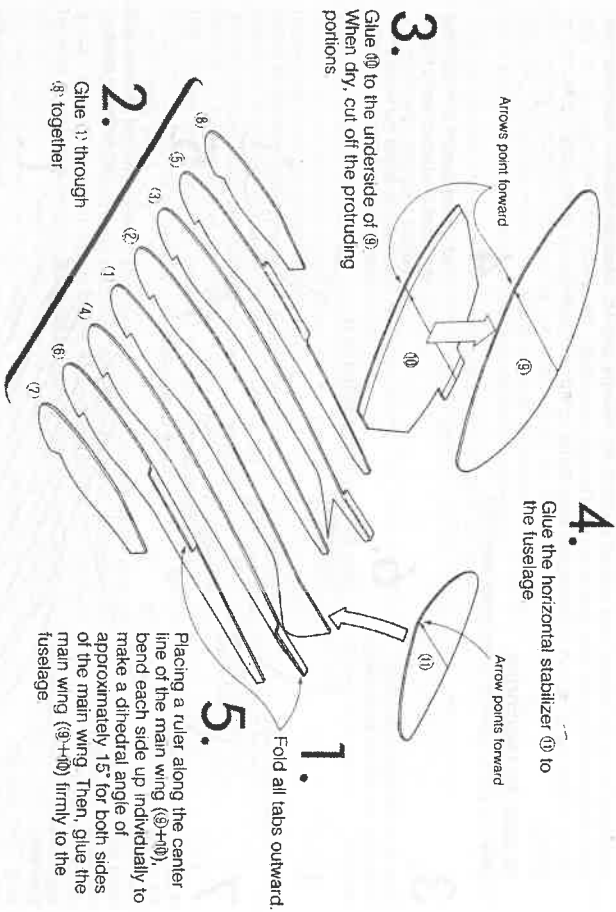


WhiteWings

Racer 525 Sparrow

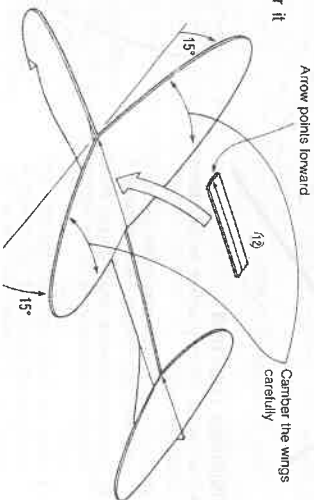
GLUING INSTRUCTIONS

Glue the parts together in the order indicated



FINISHING TOUCHES

1. Give the finishing touches to the plane after it dries thoroughly.
2. Camber the main wing slightly with your fingers.
3. Using the dihedral angle gauge, make sure the dihedral angle for the main wing is 15°.
4. Fold (12) up slightly along both sides of its center line and glue it onto the center of the main wing.
5. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.



Whitewings

Racer 526 King Fisher

This plane has a sweptback wing and vertical stabilizers made from the folded edges of the horizontal stabilizer. This type of paper airplane racer was originated by Mr. Tamoitsu Kuroda. The design continues to be developed and refined by both Mr. Kuroda and Mr. Masaaki Inoue. I have also enjoyed experimenting with this type of plane. Through this design, the plane can climb high up into the sky at a right angle without experiencing wing flutter and then it changes its flight pattern smoothly to gliding.

GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

3.

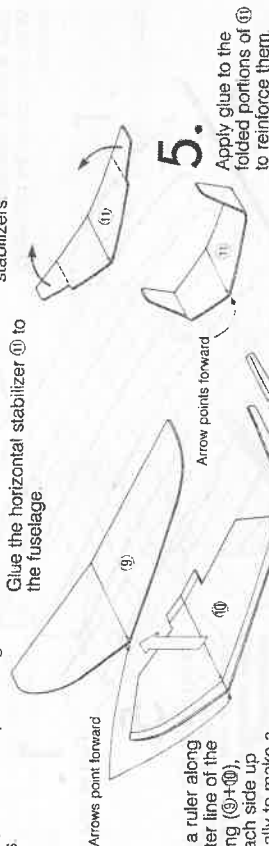
Glue ⑩ to the underside of ③. When dry, cut off the protruding portions

4.

Fold both edges of the horizontal stabilizer ⑩ upward along the dashed lines and raise them vertically to make the vertical stabilizers

6.

Glue the horizontal stabilizer ⑩ to the fuselage



7.

Placing a ruler along the center line of the main wing (③+④), bend each side up individually to make a dihedral angle of approximately 10° for both sides of the main wing. Then, glue the main wing firmly to the fuselage

2.

Glue ① through ⑧ together.

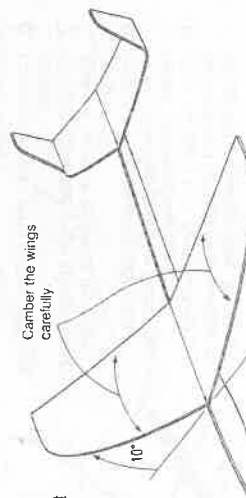
FINISHING TOUCHES

• Give the finishing touches to the plane after it dries thoroughly

8. Camber the main wing quite slightly (0.5-1%) with your fingers (Refer to page 9)

9. Using the dihedral angle gauge, make sure the dihedral angle for the main wing is 10°

10. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings



HOW TO FLY

After you fly your plane by hand and it glides smoothly and in a straight line, by using the catapult make the plane climb high up into the sky and go into a glide

One of the ideal flight patterns for a duration flight of a racer type model plane is to have the plane climb upward as straight as possible and goes gradually into a corkscrew glide with a low rate of descent

Generally speaking, all of the Whitewings racers are designed to make the horizontal stabilizer take partial responsibility for lift. (See Fig. 13 on page 32.) Therefore, when you adjust a plane for ascent and gliding, you need to take the following characteristics into consideration.

- During the plane's ascent after being launched by hand or by catapult (flying at a high speed), the control surfaces (aileron, rudder, elevator) become overly sensitive to curving.

- During the plane's glide (flying at a low speed), the tilted horizontal stabilizer becomes sensitive to curving

Therefore, in order to keep the plane climbing upward in a straight line, the main wing, the horizontal stabilizer, and the vertical stabilizer should remain flat. Once the plane is in the gliding stage, its direction and the extent of the diameter of its gliding pattern depend on a tilted horizontal stabilizer. Therefore, adjust the direction and degree of tilt of the horizontal stabilizer according to the instructions on page 15.

Here is an explanation of the characteristics of the Racer 526. One is that, as the instructions on page 31 mentioned, the sweptback main wing protects against wing flutter in a high speed flight.

The other is that the vertical stabilizers stand only on the upper side of both edges of the horizontal stabilizer. While the plane is ascending at a high speed, the upper edges of the vertical stabilizers are pressed by wind drag in this design. Being influenced by this, the horizontal stabilizer is warped as shown in Fig. 2 and the nose is pushed down. Try to press the upper edges of the vertical stabilizers by yourself, and you will find the horizontal stabilizer warped.

These phenomenon help the plane climb at a right angle without looping.

Based upon such characteristics, I will explain how to adjust the horizontal stabilizer of the Racer 526 for ascent. As shown in Fig. 2, during high speed flying the outer areas of the horizontal stabilizer (shaded portions in Fig. 3) will be angled downward by wind drag. However, the inner areas of the horizontal stabilizer near the fuselage will remain unaltered. Accordingly, when you adjust for the flight path of the plane climbing at a high speed, the method I use is to bend the area of the horizontal stabilizer near the fuselage slightly in accordance with Fig. 4.

When you adjust the plane for gliding at a lower speed, it is appropriate to bend both outer areas (the shaded portions) of the horizontal stabilizer. In order to find out how much you need to bend them, refer to Fig. 4 after you examine the flight pattern.

When to hold a plane when you launch it at a right angle depends on

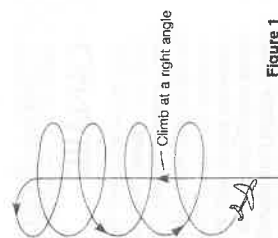


Figure 1

During a high speed flight, the outer areas of the horizontal stabilizer near the vertical stabilizer are angled downward because the upper side of the vertical stabilizers being pressed by wind drag



Figure 2

The portions of the horizontal stabilizer of which the degree of angle changes



Figure 3

The portions of the horizontal stabilizer of which the degree of angle doesn't change even during a climb at a high speed

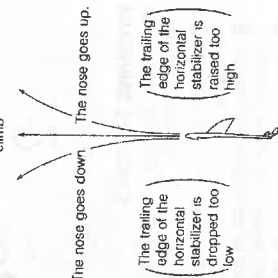


Figure 4

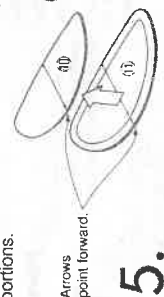
Right hand

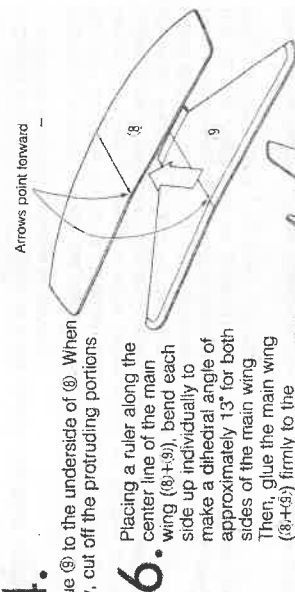
WhiteWings CANARD

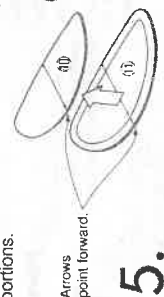
This plane is called "Canard" in English, "Ente" in German, because it is shaped like a duck in flight. You can identify this style of the plane in "Flyer" through which the Wright brothers succeeded in a power flight in 1903, "The 14 bis" in 1906 by Santos Dumont and the first water plane by Henri Fabre in 1910. The front-set tail plane has great flying power because the upward draft of air (termed lift) is created not only on the main wing, but also on the front wing. Recently Dr. Paul B. MacCready's man-powered plane with this design took the Kremer Prize and made a cross-channel flight between England and France. The Voyager, another canard model, designed by Burt Rutan made a non-stop flight around the world.

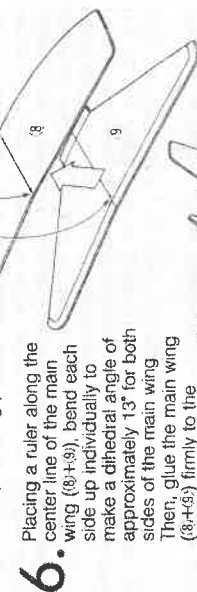
GLUING INSTRUCTIONS

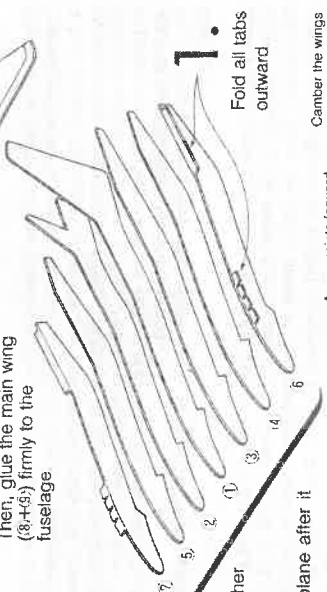
Glue the parts together in the order indicated.

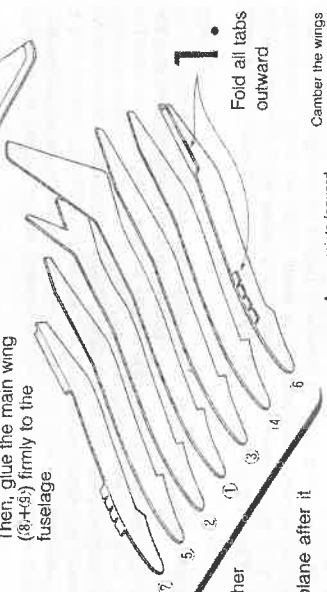
3. 

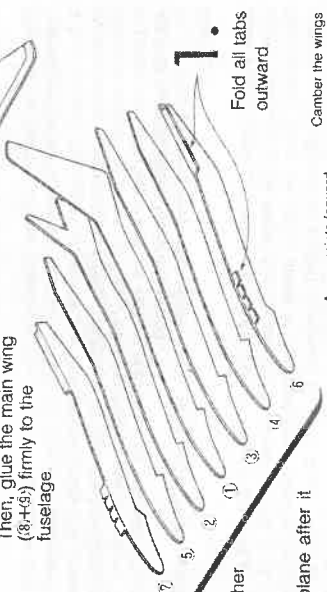
Glue (10) to the underside of (8). When dry, cut off the protruding portions.
4. 

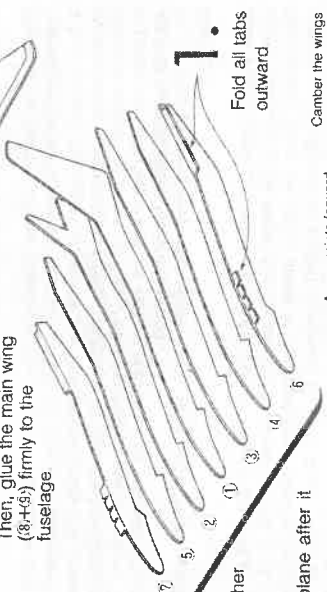
Placing a ruler along the center line of the main wing (8+9), bend each side up individually to make a dihedral angle of approximately 13° for both sides of the main wing. Then, glue the main wing (8+9) firmly to the fuselage.
5. 

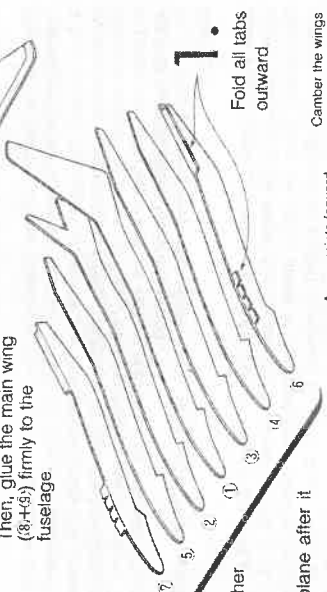
Camber the center part of the front wing (10+11) after the curve of its gluing position on the fuselage, and then glue it firmly to the fuselage.
6. 

Glue the vertical stabilizers (9) and (11) to the tabs of the main wing (8+9), aligning the arrows on (10) and (11) with the folded tab lines of the main wing.
7. 

Glue (1) through (7) together.
8. 

Camber the main wing slightly with your fingers.
9. 

Using the dihedral angle gauge on the main wing, check if the dihedral angle is 13°.
10. 

Placing a ruler along the center line, fold part (12) slightly upward from the center line. Then, glue (12) to the center of the main wing.
11. 

View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly.
- 7. Camber the main wing slightly with your fingers.
- 8. Using the dihedral angle gauge on the main wing, check if the dihedral angle is 13°.
- 9. Placing a ruler along the center line, fold part (12) slightly upward from the center line. Then, glue (12) to the center of the main wing.
- 10. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

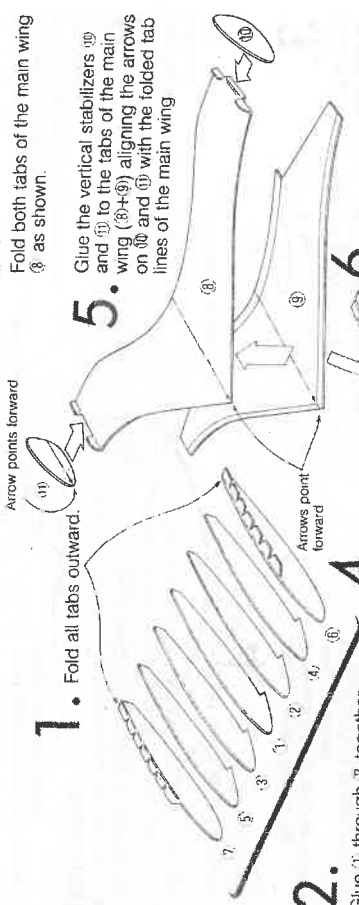
WhiteWings TAILLESS PLANE

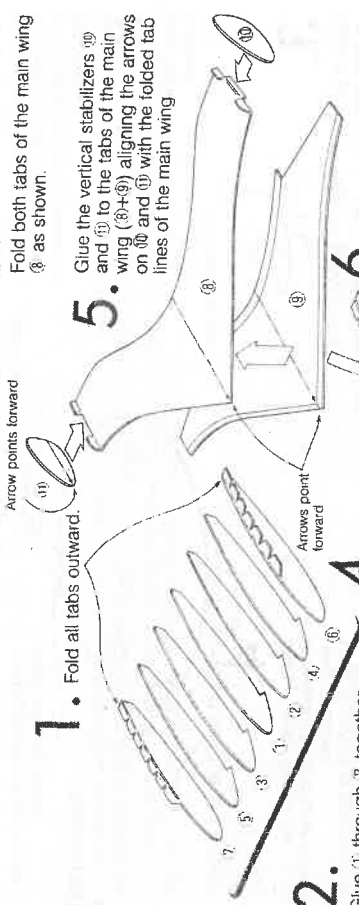
In the tailless plane, the trailing edges of the main wing play the role of the horizontal stabilizer. In the case of regular planes, a longer distance between the main wing and the horizontal stabilizer maintains the longitudinal balance of the plane and there is a main wing with dihedral angle. Since this plane doesn't have either characteristic, it requires the sweptback wing in order to substitute for what it lacks.

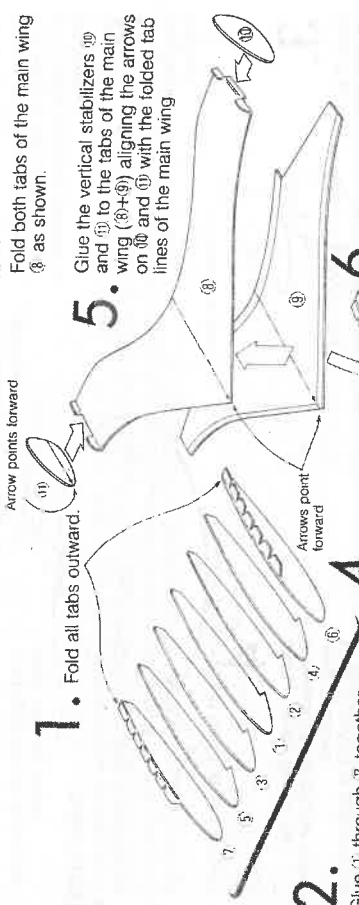
The sweptback angle design of the main wing provides for specified distances to the back sides of both edges of the main wing which play the role of the horizontal stabilizer. Moreover, the sweptback angle of the main wing also acts as a substitute for the dihedral angle. The sweptback angle, however, tends to cause a "tip stall" which sends the plane into a spin so the sharpness of this angle has been reduced toward the edges of the main wing. This design process ended with the birth of the tailless plane.

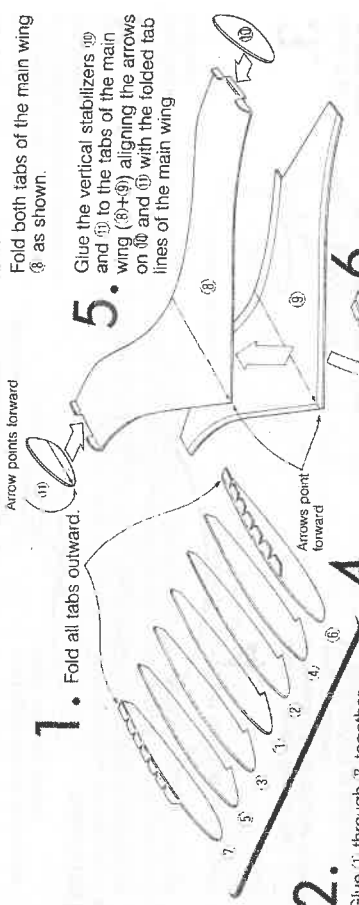
GLUING INSTRUCTIONS

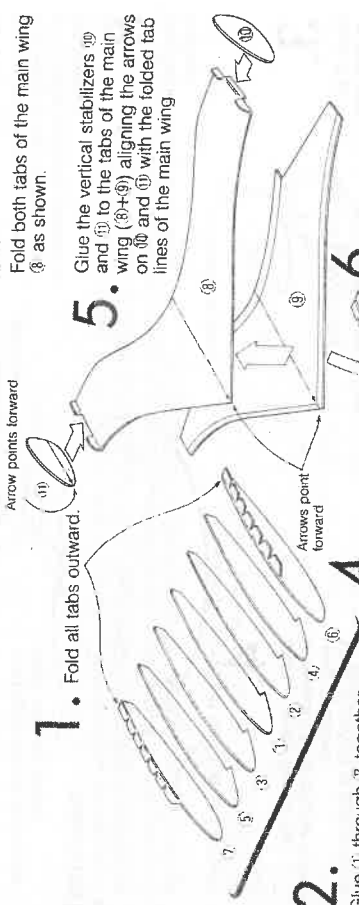
Glue the parts together in the order indicated.

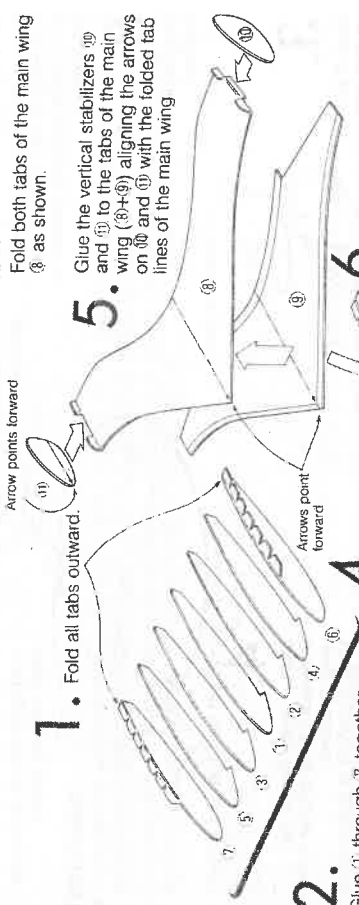
1. 

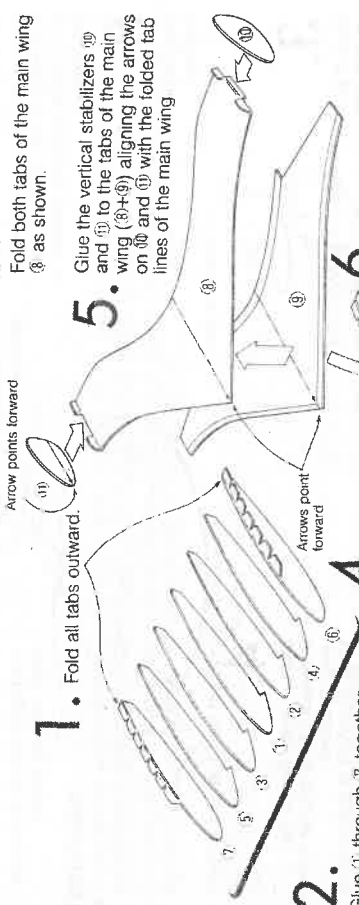
Fold all tabs outward.
2. 

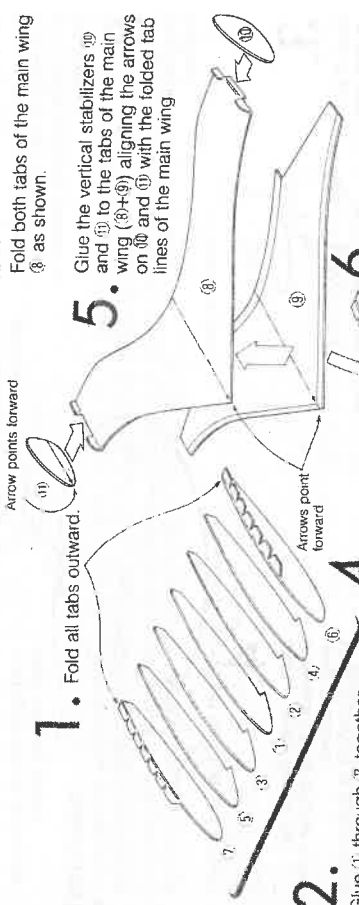
Glue (1) through (7) together.
3. 

Fold both tabs of the main wing (8) as shown.
4. 

Glue the vertical stabilizers (9) and (11) to the tabs of the main wing (8+9), aligning the arrows on (10) and (11) with the folded tab lines of the main wing.
5. 

Camber the center part of the main wing (8+9) after the curve of its gluing position on the fuselage and then glue it firmly to the fuselage.
6. 

Glue (1) through (7) together.
7. 

Camber the main wing carefully according to the instructions shown right.
8. 

View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly.
- 7. Camber the main wing carefully according to the instructions shown right.
- 8. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

TEST FLIGHT

The front view of the plane

The back sides on both edges of the main wing are turned up-

WhiteWings

CIRCULAR WING CANARD

Even if this plane had only a single circular main wing, it would fly well as long as its center of gravity was placed at an appropriate position. But this plane has an additional wing placed toward the nose and is easier to fly due to the longitudinal stability produced by this design.

GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

6.

Glue the vertical stabilizers (11) and (12) to the tabs of the circular main wing (9) aligning the arrows on (11) and (12) with the folded tab lines of (9).

Arrow points forward

7.

Glue the center part of the front wing (13+14) carefully after the curve of its gluing position on the fuselage.

8.

Glue the front wing firmly to the fuselage.

Arrow points forward

3.

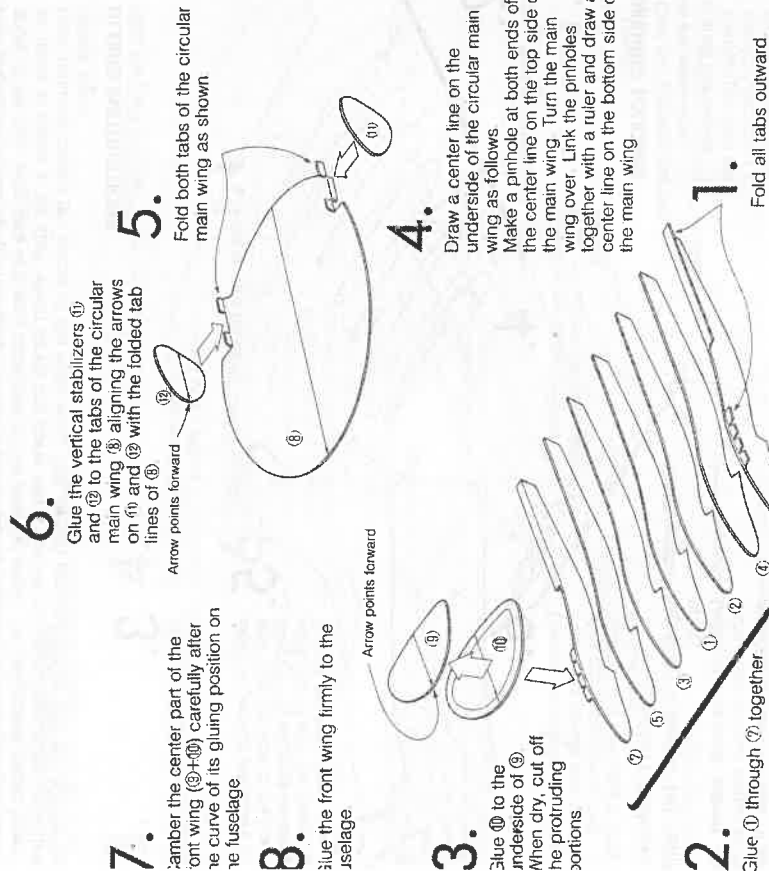
Glue (10) to the underside of (9). When dry, cut off the protruding portions.

2.

Glue (1) through (7) together.

9.

Glue the circular main wing firmly to the fuselage connecting the center line drawn on the



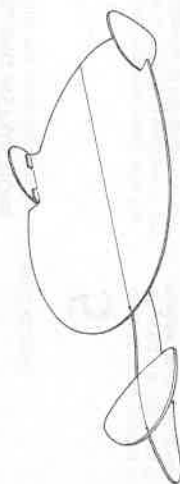
FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly.

10. Gently curve the circular main wing upward about 1cm (2/5") as shown to make a dihedral angle.



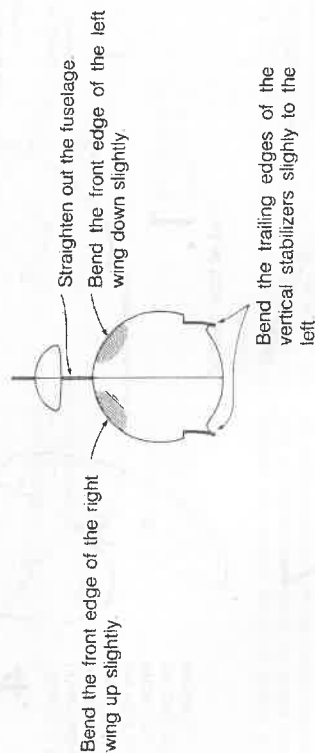
11. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.



TEST FLIGHT

- Try to test fly your plane when there is a gentle breeze. Throw the plane gently forward aiming it horizontally or slightly downward. Examine the flight pattern and then proceed to adjust your plane. For your better understanding of the principles used in adjusting the Circular Wing Canard, refer to the Test Flight instructions for Canard Planes in pages 11 to 14.

How to adjust when the plane curves right.
(If it curves left, apply the reverse adjustment.)



How to adjust when the nose goes up or down

- (a) Bend the trailing edges of the front wings slightly upward.
- (b)



WhiteWings

OBLIQUE WING PLANE

The oblique wing was designed by Dr. Robert T. Jones of The Ames Research Center in NASA. This wing meets with less resistance than the wings widely used in jet planes. Therefore, given the same amount of fuel energy, an oblique wing craft will fly faster and farther than a conventional jet wing design. At NASA experiments are being carried out with full-scale models. Although the same advantage is harder to obtain for paper planes because of their lower than sonic speed, I am sure you too will find it interesting that this model displays stable flight performance despite its oblique shape wing design. Build it by yourself and try to fly it. It will surely fly well after careful adjustment.

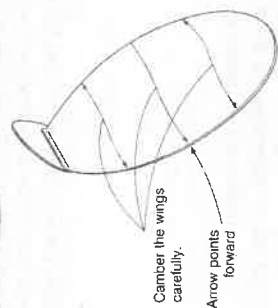
GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

6.

Camber the main wing after the curve of its gluing position on the fuselage as in the cross section shown below.

front back



5.

Glue ⑩ to the side of ③+⑪ aligning the arrow on ⑩ with the folded tab line of ③+⑪.

Arrow points forward

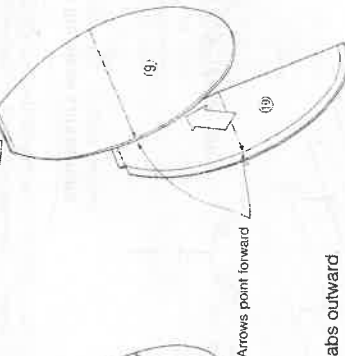


3.

Fold the tab on ③ upward and the tab on ⑪ downward.

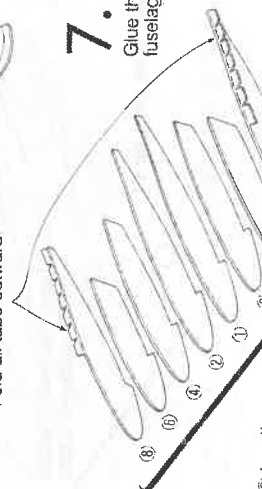
4.

Glue ⑩ to the underside of ③, truing up the front edge line of ⑩ to the front edge of ③. When dry, cut off the protruding portions.



1.

Fold all tabs outward



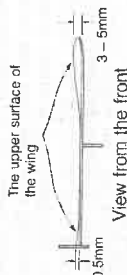
2.

Glue the wing (③+⑪) firmly to the fuselage.

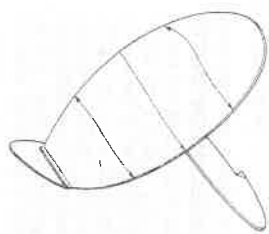
FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly

- Carefully turn up the back left end (back right end from the front) of the main wing 3 - 5mm (1/10 - 1/5") with your fingers. In the same manner, turn up the back right end (back left end from the front) of the main wing 0.5mm (1/50")



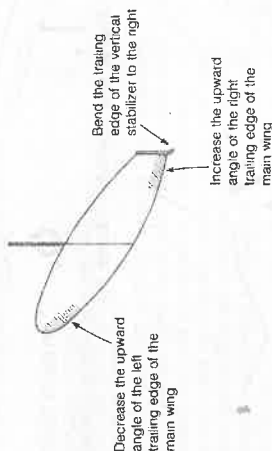
- View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings



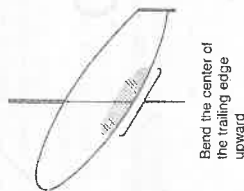
TEST FLIGHT & HOW TO PILOT

- In principle, adjusting the oblique wing tailless plane is the same as that of the ordinary tailless plane. So, test fly the plane referring to the Test Flight instructions for Tailless Planes on pages 11 to 14 and How to Pilot instructions on page 17

If you want your plane to curve to the right : (if you want the nose of your plane to dip down, apply the reverse adjustment)



If you want the nose of your plane to point up: (if you want the nose of your plane to dip down, apply the reverse adjustment.)



[Note 1]

There is a knack in flying stably this oblique wing tailless plane by hand or by catapult. Following the instructions above, adjust the wing for the flight pattern which curves to the right. This plane has a right-side sweepback wing, so it is easy to restore its balance through the dihedral effect of the sweepback wing even if it is tilted to the right. Accordingly, if you adjust the wing for the flight pattern which curves to the left, the plane will dip downward to the ground because it can't restore its balance. Try to test fly throw-

[Note 2]

This oblique wing tailless plane is drawn for the curve to the right, so it is easy for right-handed people to fly it. If you are left-handed and anticipate having difficulties flying it, glue the main wing and vertical stabilizer in an inverted manner. The oblique wing will then have a swept-back left side necessary for the flight pattern which curves to the left.

WhiteWings

PAIR PLANE

A plane designed to load a much smaller plane can allow the "baby plane" to fly solo after the launch. Here are two different designs for "baby planes". If you follow these design instructions and make your baby planes with very light and thin paper, you may enjoy watching them in their extended flights. The mother plane is launched high up into the sky and at a certain height the "baby plane" is released into the air for its own flight. The mother plane then begins coming downward at an abbreviated glide ratio (see p. 28) as the design utilizes a lowered wing which works as a brake. The mother plane has the convenient tendency of gliding down to the spot where the launch originated so you need not travel far to retrieve it.

GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

MOTHER PLANE

1. Glue ① through ⑥ together.
2. Draw a center line on the underside of part ⑩ referring to the instruction 4 of the Circular Wing Canard on page 46.
3. DON'T make a creased line as if using a knife. Place a ruler on the underside of ⑩ and fold downward along the dotted line. Make sure the dotted line is facing outward.
4. Fold all tabs outward.
5. Cut the small darker shaded boxes out.
6. Bend both ends of ⑨ up to make a 35° dihedral angle on each side.
7. Apply glue to the shaded part of ⑩ and attach it to the underside of the main wing ⑧.
8. Glue the main wing ⑧ firmly to the underside of the fuselage.
9. Glue the horizontal stabilizer ⑩ to the top of the vertical stabilizer.
10. When dry, bore a hole in the circle shown with a gimlet (you may do so before you glue them together).

11. Using the dihedral angle gauge, make sure the dihedral angle is 35°.
12. DON'T camber the main wing on this plane.
13. Cut the enclosed round rubber band at any point once and pass it through the gimlet hole in the fuselage and tie the ends loosely.

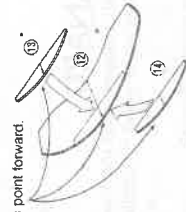
FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly.

BABY PLANE Design 1

1. Cut out part ① to use as a pattern. Copy the pattern onto thin paper and cut it out as part ②.
2. Cut out part ③. By using this as a pattern, make two more pieces out of an unused portion of the cut-out drawing. Name them parts ④ and ⑤.
3. Glue ③ and ④ to the front portion of ② on both sides respectively.
4. View the plane from both the front and the back and straighten any warps and bends in it.
5. Bend the trailing edges of the part ② slightly upward (0.5mm or 1/50")

Arrows point forward.



BABY PLANE Design 2

- Cut out ⑥ to use as a pattern. Copy this pattern onto the enclosed silver color paper and cut it out. When you release this strip in the air it comes downward very slowly by rolling around the longitudinal center line as an axis.



You may use whichever design you like as a baby plane. It's convenient to use design 2 as it is easier to make and therefore easier to replace if it becomes lost. When you make this with the silver paper it is especially beautiful to see it glittering in the sunshine and lingering in the air. It can also be a sensor to identify "thermal" if you keep the patterns ⑥, ⑦, and ⑧; you can make many of these baby planes. However, do not litter your flying area with those babies.

TEST FLIGHT

MOTHER PLANE

You have to test fly the mother plane with its lowered wing shut. To do so, pass the rubber band under the lowered wing to wind it around the fuselage (see flight instructions below) and attach the end of the band to the fuselage with scotch tape so that the band won't loosen. Now you can test fly the plane by following the Test Flight instructions for Regular Planes on pages 11 to 14.

BABY PLANE Design 1

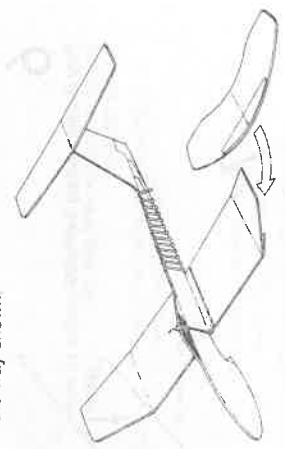
Test fly this baby plane according to the Test Flight instructions for Tailless Planes on pages 13 and 14. However, as this plane does not have a vertical stabilizer you need only to adjust the trailing edges of the main wing. Hold the plane with your thumb and two other fingers as shown and release it forward.

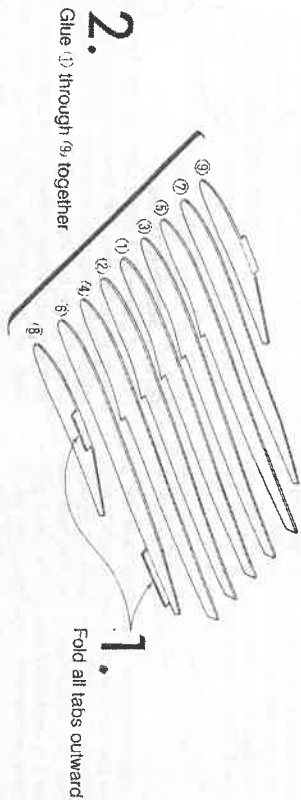


FLIGHT INSTRUCTIONS

First, let the mother plane carry a baby between the main wing and the lowered wing. Pull the rubber band and wind it around the fuselage as shown. Hold the end of the band against the hook of the fuselage, and launch the plane straight up into the sky. As it ascends, the mother plane will release the baby as the band unwinds.

In order to make the rubber band unwind in the air successfully, you have to pull the band and wrap it around the fuselage approximately 20 times without overlapping. If the baby 1 is not released successfully into the air in this manner, you may try to insert the baby in reverse, front side facing backward, in the mother's main wing. Conversely if a baby is released too soon after the mother plane has been launched and is still climbing up, you may bend the lowered wing in the way shown.

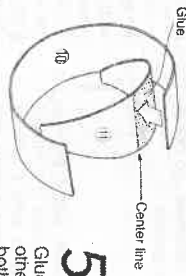




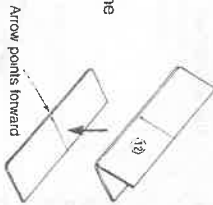
2. Glue (1) through (9), together

3. Roll up (9) and (1) with your fingers keeping the printed center line of (10) facing outward

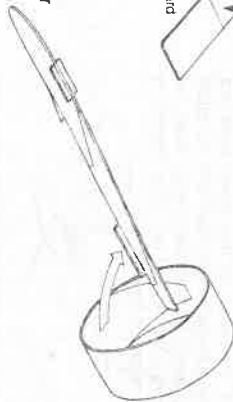
4. Glue one side from the center line of (6) to the inside of (10) aligning the edge of (10) with the center line of (6)



6. Fold the front wing (12) with the dotted line outside and glue the insides together



7. Glue (12) to the fuselage putting the center line of (12) on the center of the fuselage

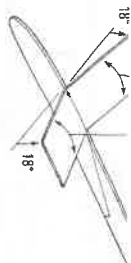


8. Glue the inside of the ring wing to the tag of the fuselage putting the joint portion (10a-11) of the wing under the center of the fuselage

11. Make the ring wing's shape as round as possible
12. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

TEST FLIGHT

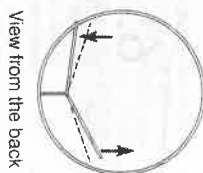
When there is a gentle breeze, toss your plane forward aiming it horizontally or slightly downward and adjust it according to the following instructions. However, adjusting the ring wing canard is the same as that of the ordinary canard in principle. So, test fly the plane also referring to the Test Flight instructions for Canard Planes on pages 11 to 14.



How to adjust when the plane curves right

1. Straighten any bends in the fuselage.
2. Straighten the inclination and warps in the wings.
3. If the plane still curves right, view the plane from the back and tilt the front wing left as shown. Examine the flight pattern and decide how much you need to tilt the wing keeping the dihedral angle at 18°. Place the dihedral angle gauge on it again to check the dihedral angle.

[If it curves left, tilt the front wing right.]



How to adjust when the plane goes up or down.

- (a) Bend the trailing edges of the front wing slightly upward.
- (b) Just right
- (c) Bend the trailing edges of the front wing slightly downward.

The instructions above to tilt the front wing left or right is the way to curve the ring wing canard plane. Refer to How to Pilot instructions on page 16.

GLUING INSTRUCTIONS

Glue the parts together in the order indicated.

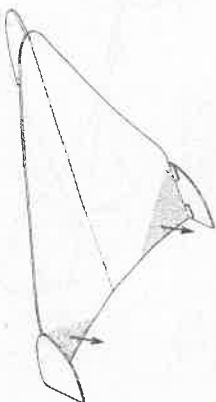
1. Fold all tabs outward. Arrow points forward as shown.
2. Glue ① through ⑥ together.
3. Glue ③ to the underside of ②, fixing each pointed end together. When dry, cut off the protruding portions. Arrows point forward.
4. Draw a center line on the underside of the main wing (⑦ + ⑧) referring to the instruction 4 of the Circular Wing Canard on page 46.
5. Fold the tabs of the main wing as shown.
6. Glue the vertical stabilizers ⑨ and ⑩ to the tabs of the main wing (⑦ + ⑧) aligning the arrows on ⑨ and ⑩ with the folded tab lines of the main wing.
7. Glue the main wing firmly to the fuselage aligning the center line drawn on the underside of the main wing with the center of the fuselage.

FINISHING TOUCHES

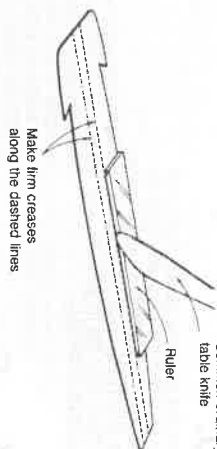
- Give the finishing touches to the plane after it dries thoroughly.
- 8. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings. Be sure to flatten the main wing.
- 9. Bend the shaded portions slightly upward by 0.5 – 1.0 mm (1/50" – 1/25"). Examine the flight pattern and decide how much you need to bend the wing upward.

TEST FLIGHT

- The method of adjustment is the same as that of Tailless Plane. Test fly the plane according to the Test Flight instructions for Tailless Planes on pages 11 to 14.

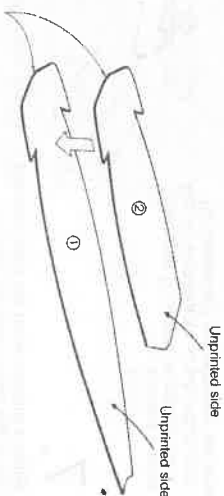


1. Make firm creases along the dashed lines of fuselage pieces (①) & (②) using a common ordinary table knife (blunt knife) and a ruler (A steel or glass ruler is desirable) as a guide. Avoid cutting through the dashed lines.

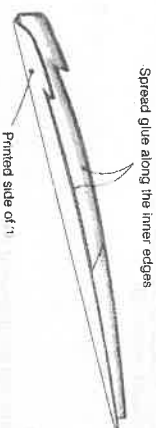


2. Spread glue evenly over the entire surface of the printed side of ②. Apply ② to the unprinted side of ①. Make very sure that the edges of ① and ② that form the plane nose are placed together evenly, or flush, as shown in the diagram.

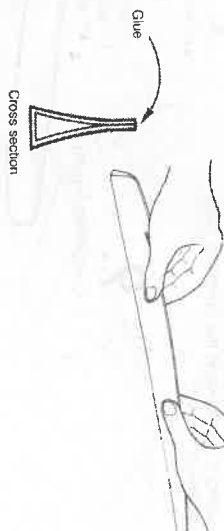
Make very sure that the edges of ① and ② are placed together evenly.



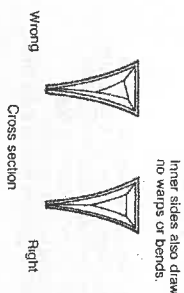
3. Before the glue dries, fold ① and ② along the creased dashed lines having ② face inward. Then spread glue along the inner edges as shown.



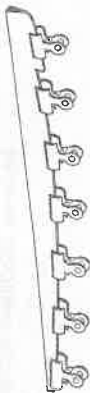
4. Glue the inner edges together to complete the formation of the cross section as shown.



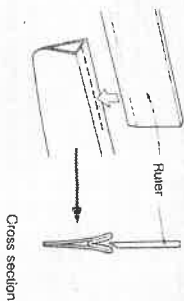
5. View the fuselage closely from both the front and the back and carefully straighten any warps or bends before the glue dries. Look inside of the fuselage to make sure the inner sides also draw no warps or bends.



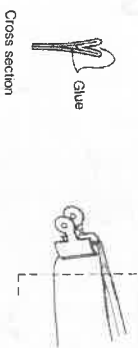
6. Let the fuselage dry completely by attaching clips or clothespins on the glued edges as shown. It takes at least 2 hours to dry.



7. Make a groove along the thick dashed line at the plane nose by carefully pressing down upon it with a ruler. The groove must be deeper at the tip of the plane nose than at any other part. The remaining area of the top of the fuselage, except for the thick dashed line, should remain flat.



8. Put glue into the groove at the tip of the plane nose and both inner sides of the plane nose and glue together. Let it dry thoroughly (at least 2 hours) using a clip to keep the tip of the nose in place.



9. Completed Figure



GLUING INSTRUCTIONS

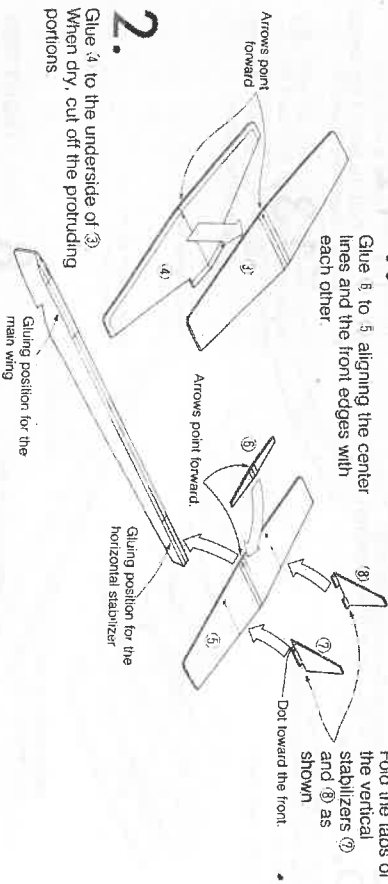
Glue the parts together in the order indicated.

1. Assemble the fuselage following the assembly instructions for the triangular fuselage on pages 55 and 56

5. Glue the vertical stabilizers (7) and (8) to the gluing positions for the vertical stabilizer on the fuselage. Make sure to align the trailing edges of the vertical stabilizers (7) and (8) with the trailing edges of the horizontal stabilizer.

6. Glue the horizontal stabilizer (5) and (6) firmly to the gluing position for the horizontal stabilizer on the fuselage. Make sure to align the center line of the horizontal stabilizer (5) and (6) with the center line on the fuselage

4. Glue (5) to (6) aligning the center lines and the front edges with each other



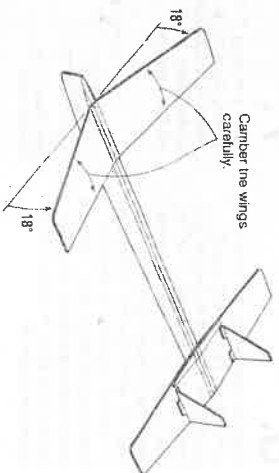
2. Glue (4) to the underside of (3). When dry, cut off the protruding portions.

FINISHING TOUCHES

- Give the finishing touches to the plane after it dries thoroughly
- Place a ruler along each of the outer lines of the main wing and bend each side up individually to make a dihedral angle of 18° for both sides of the main wing
- Camber the main wing slightly with your fingers (The horizontal stabilizer should remain flat.)
- View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings

TEST FLIGHT

- Test fly the plane according to the Test Flight instructions for Regular Planes on pages 11 to 14

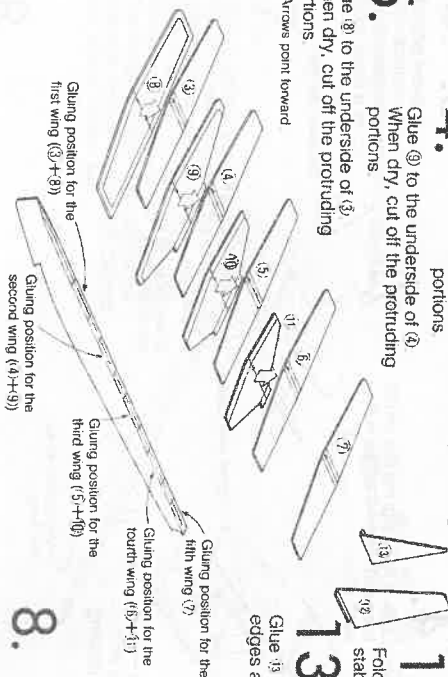


GLUING INSTRUCTIONS

Glue the parts together in the order indicated

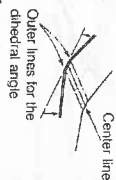
1. Assemble the fuselage following the assembly instructions for the triangular fuselage on pages 55 and 56
2. Glue (1) to the underside of (6). When dry, cut off the protruding portions
3. Glue (10) to the underside of (5). When dry, cut off the protruding portions
4. Glue (9) to the underside of (4). When dry, cut off the protruding portions
5. Glue (8) to the underside of (3). When dry, cut off the protruding portions

Arrows point forward



14. Glue the vertical stabilizers (12+13) to the wing (7), aligning the center of the folded tab lines of the vertical stabilizer with the center line of the wing (7). A section of bottom edge of the vertical stabilizer will protrude from the wing (7).
12. Fold the tabs of the vertical stabilizers (12 and 13)
13. Glue (13) to (12) aligning their front edges at the bottom

6. Place a ruler along the outer lines of the wing (3+8) and bend each side upward individually to make a dihedral angle of 18° for both sides. In the same manner, bend each side of the 2nd, 3rd and 4th wing upward individually to make a dihedral angle for both sides of each wing. Reduce their angles gradually from the front to the back as shown in the figure on page 59.
7. Glue the wing (7) firmly to its gluing position on the fuselage. Make sure to align the center line of the wing (7) with the center line on the fuselage

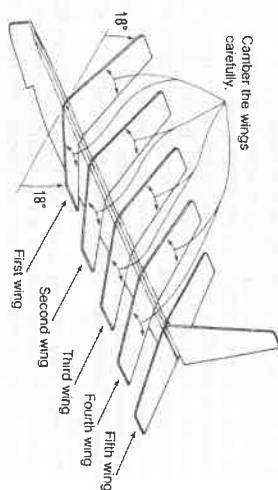


8. Glue the wing (5+10) firmly to its gluing position on the fuselage
9. Glue the wing (6+11) firmly to its gluing position on the fuselage
10. Glue the wing (4+9) firmly to its gluing position on the fuselage
11. Glue the wing (3+8) firmly to its gluing position on the fuselage

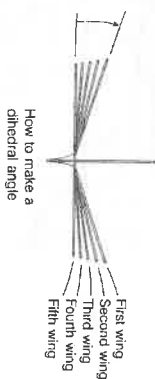
15. Make the wing (7) (the fifth wing from the front) flat (a dihedral angle of 0°)

16. Camber all wings but the fifth wing carefully with your fingers. (The fifth wing should remain flat.)

17. Using the dihedral angle gauge, make sure the dihedral angle for the first wing (3+8) is 18°



18. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings



TEST FLIGHT

- Test fly the plane according to the Test Flight instructions for Regular Planes on pages 11 to 14. Adjust the first and the second wing as the main wing and the fifth wing as the horizontal stabilizer. Straighten any warps or bends in the third or the fourth wing. If the trailing edge of the horizontal stabilizer is dropped too low, this plane will have difficulty recovering from an inverted flight.

concerned with the vertical stabilizer. Refer to Fig. 1 to see the placement of the main wing, the horizontal stabilizer and the center of gravity for each plane with contrastive wings.

The combinations with right and left half of each model are shown in Fig. 2. Each model mentioned in A, B, C, D and E has its own way of regaining its balance between its lift and gravity when the angle of attack is changed by a gust of wind. Even if such different planes are combined into one, they will fly well on the condition that the longitudinal stability is maintained by a well-adjusted main wing and horizontal stabilizer. (In the case of pitching, it may remain yawing, but a normal flight would be expected.) This model is in between BC, BE and CE. If adjusted to curve gently to the right, it will perform well, much like a racer type model. The longest recorded flight of this plane is 29 seconds. However, the asymmetrical wing plane will easily lose its gliding stability in turbulent air. Also, when the plane crashes into a wall or dives to the ground, the fuselage will easily be bent by the force of impact. Therefore, be careful to test fly and after the adjustments are complete, gradually fly it up into the sky in stages.

The three planes in Fig. 3 are AB, CD and CE from the left. After the experiment, all of them glided normally. However, there is a big difference between the initial speed just after launching and the speed in which the plane naturally glides. Therefore, in order to design a plane with excellent flying performance, you need to pay attention to combining two planes which have as much the same effect on the change of speed as possible.

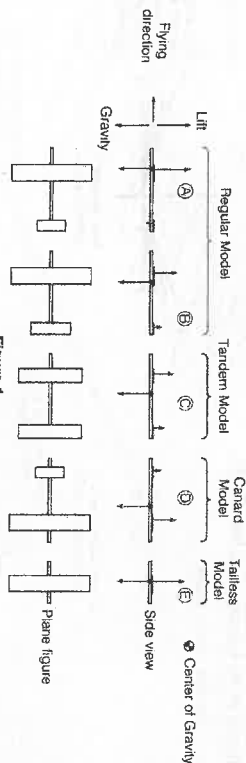


Figure 1

	A	B	C	D	E
A		AB	AC	AD	AE
B	*		BC	BD	BE
C	*	*		CD	CE
D	*	*	*		DE
E	*	*	*	*	

Figure 2

Asterisk (*) means omissions because the combinations on both sides are the same.

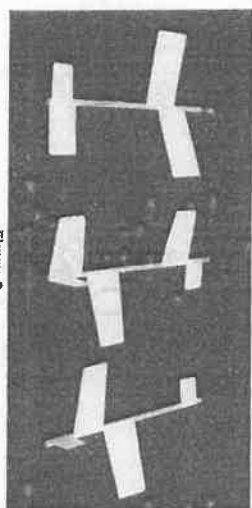
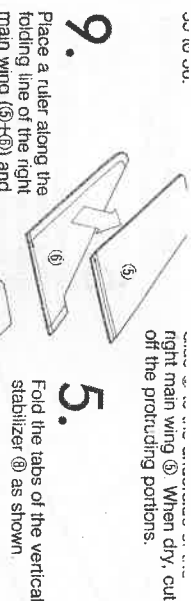


Figure 3

right main wing (5). When dry, cut off the protruding portions.

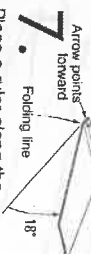


5. Fold the tabs of the vertical stabilizer (6) as shown.

9. Place a ruler along the folding line of the right main wing (5) and bend it upward to make a dihedral angle of approximately 18°.

10. Glue the right main wing (5) firmly to its gluing position on the fuselage.

8. Glue the left main wing (3) firmly to its gluing position on the fuselage.



7. Place a ruler along the folding line of the left main wing (3) and bend it upward to make a dihedral angle of approximately 18°.

FINISHING TOUCHES

Give the finishing touches to the plane after it dries thoroughly.

11. Using the dihedral angle gauge, make sure the dihedral angle for both main wings is 18°.

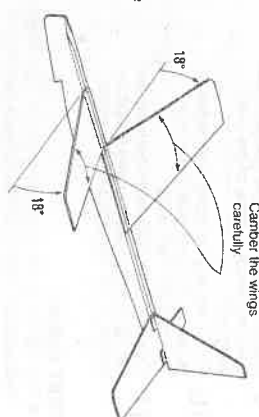
12. Camber the main wings slightly with your fingers.

13. View the plane from both the front and the back and straighten any warps or bends in the fuselage and the wings.

TEST FLIGHT

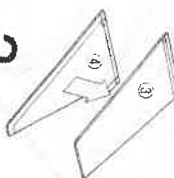
The method of adjustment for this plane is the same as that for regular planes. Test fly the plane according to the Test Flight instructions for Regular Planes on pages 11 to 14.

In order to fly this plane high up into the sky, a gentle curve to the right will create a more stable flight than a curve to the left. Following how to Pilot instructions on page 15, adjust the plane to curve to the right by slightly bending the trailing edges of both the left and right main wings and the vertical stabilizer, examining the flight pattern.



gluing position on the center line of the horizontal stabilizer. (A section of the bottom edge of (6) will protrude from the horizontal stabilizer. Don't cut it off.)


4. Glue the horizontal stabilizer (7) firmly to its gluing position on the fuselage. Make sure to align the center line of the horizontal stabilizer (7) with the center line on the fuselage.



2. Glue (4) to the underside of the left main wing (3). When dry, cut off the protruding portions.

Arrows point forward

5. Glue the vertical stabilizers $1\frac{1}{2}$ and $\frac{1}{2}$ to the tabs of the horizontal stabilizer $1\frac{1}{2}$ aligning the arrows on $1\frac{1}{2}$ and $\frac{1}{2}$ with the folded tab lines of $1\frac{1}{2}$.

Fold both tabs of the horizontal stabilizer  as shown.

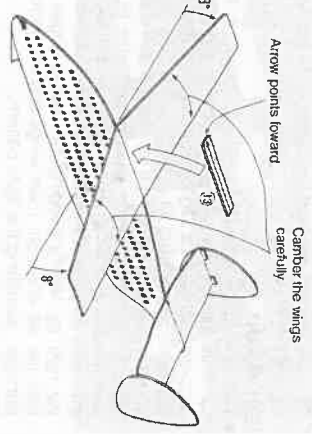
1.

Fold all tabs outward

- Give the finishing touches to the plane after it dries thoroughly

8. Carber the main wing slightly with your fingers.
9. Using the dihedral angle gauge, make sure the dihedral angle of the main wing is 8° .
10. Fold $\textcircled{3}$ up slightly along both sides of its center line and glue it onto the center of the main wing.
11. View the plane from both the front and the back and straighten any warps or bands in the fuselage and the wings.

- Test fly the plane according to the Test Flight instructions for Regular Planes on pages 11 to 14.



6. Fold the cockpit (3) slightly along the dotted line. Sew the whole of the cockpit into to complete its oval shape glue the tag as shown

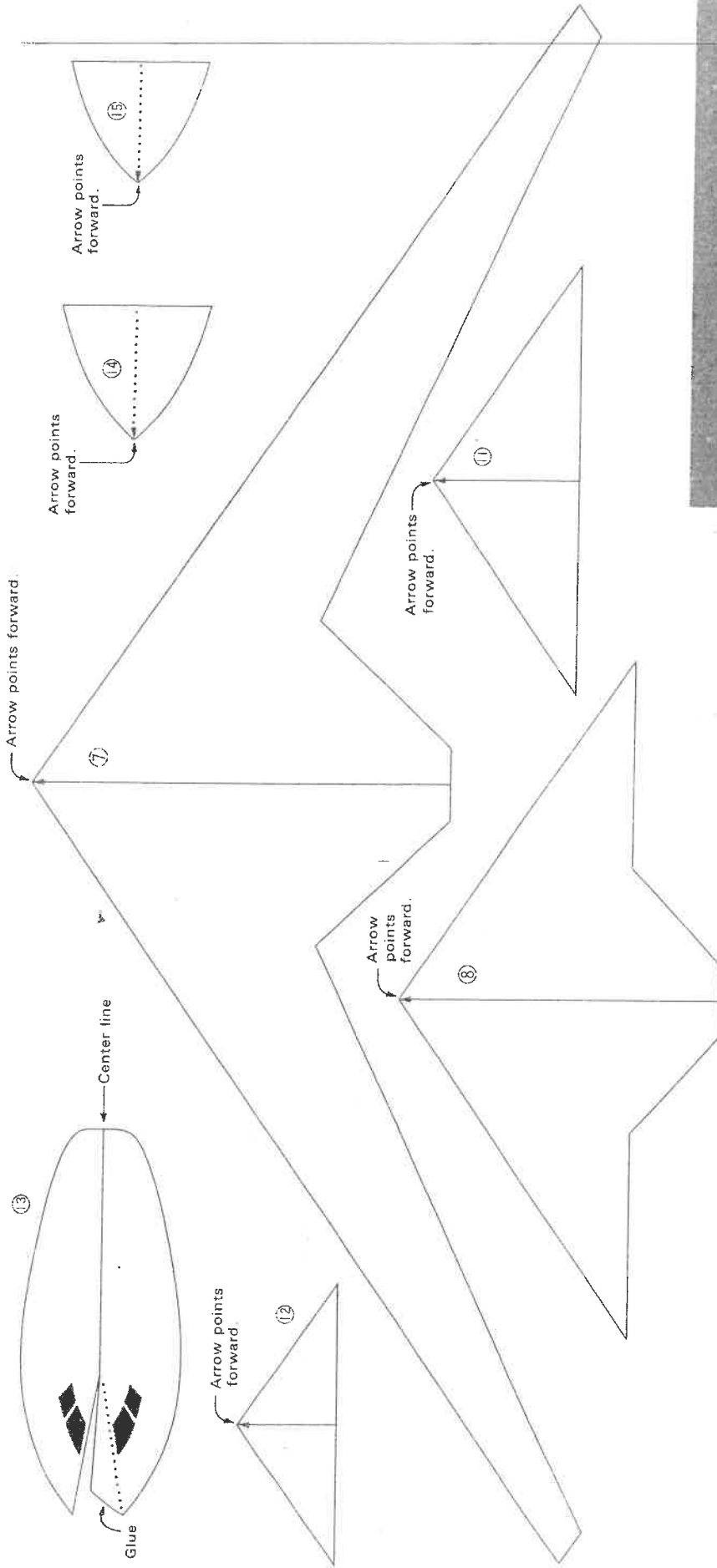
7.

8.

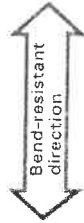
- Give the finishing touches to the plane after it dries thoroughly

9. View the main wing from both the front and the back and flatten it with your fingers (Don't camber it.) Then, bend the right and left trailing edges of the main wing (shaded portions) slightly upward 1.5–3mm (1/16–1/8").

- Test fly the plane according to the Test Flight instructions for Tailless Planes on pages 11 to 14

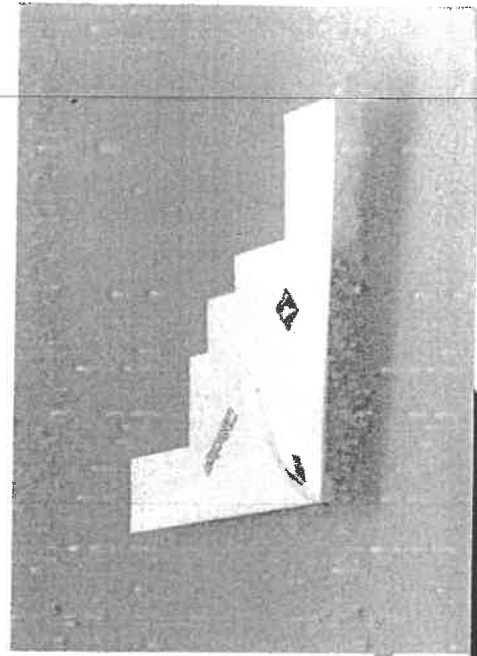


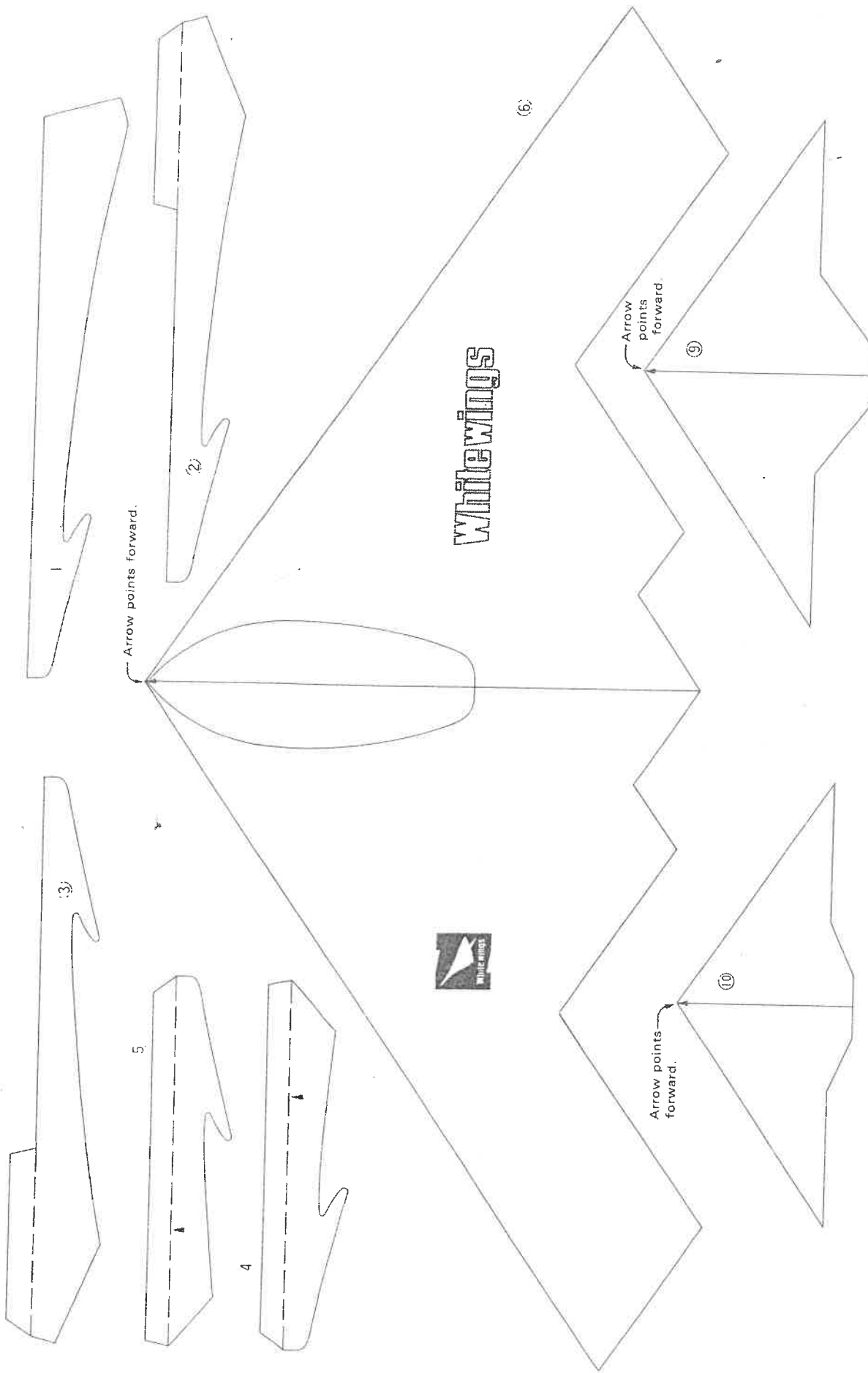
..... Fold with dotted line outside.
 - - - - - Fold with dashed line inside.
 ↑ Arrows point forward.



WhiteWings®

Northrop B-2 Stealth bomber





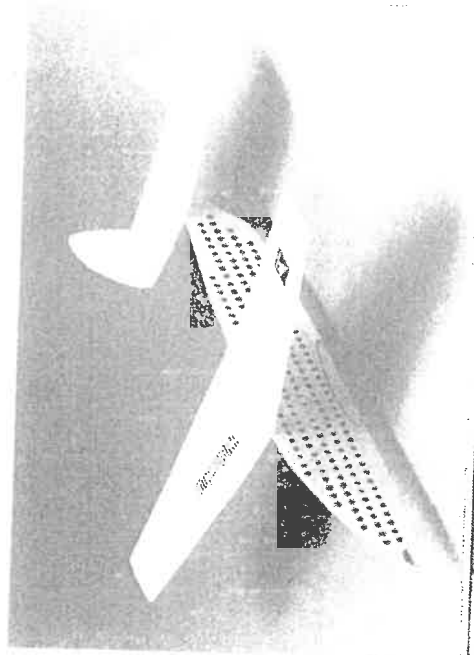
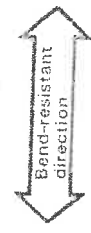


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PANORAMA PLANE

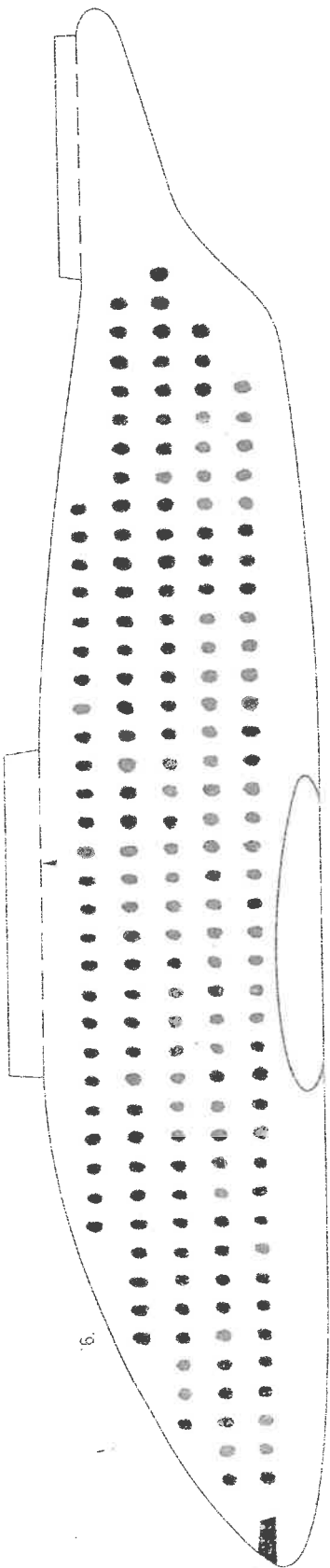
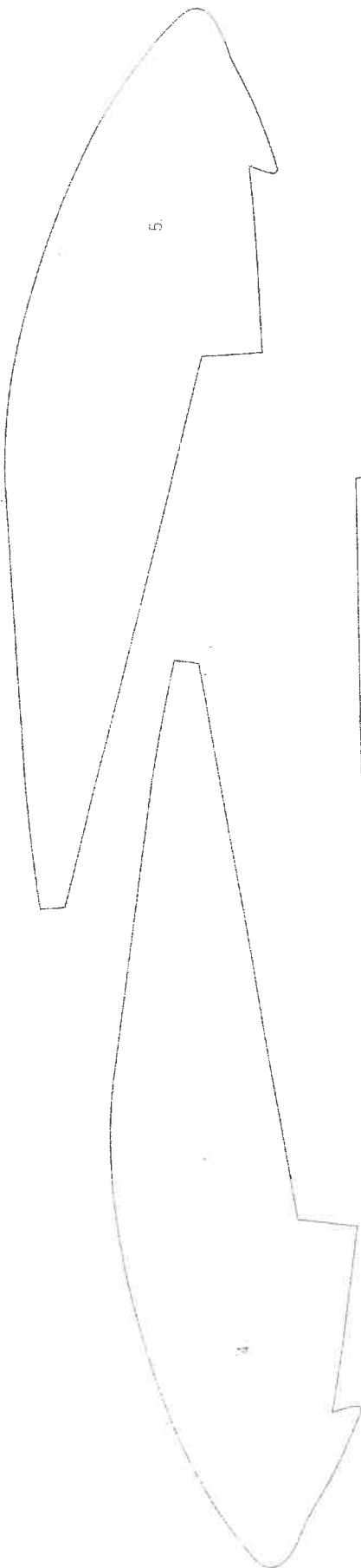
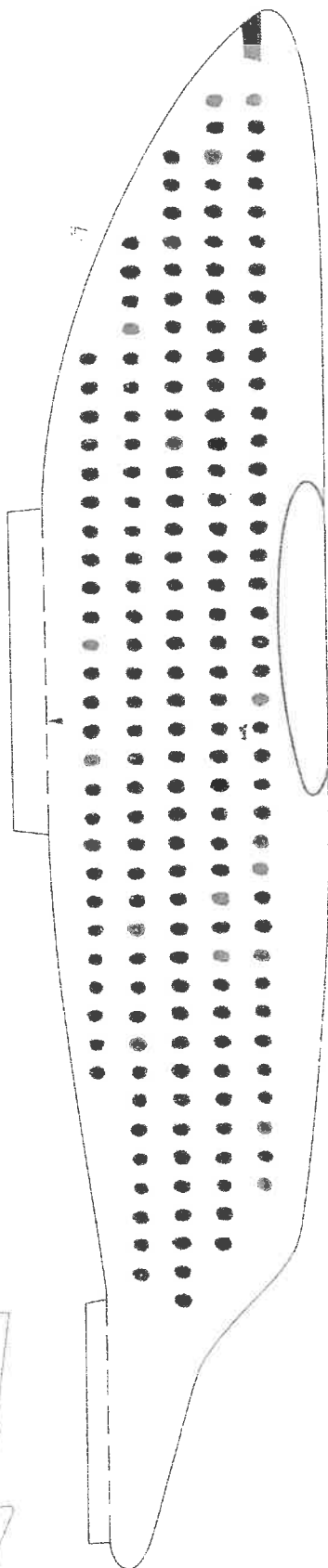
© 1990 Yasuaki Ninomiya (All rights reserved. Reproduction prohibited.)

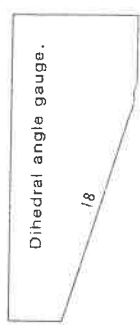
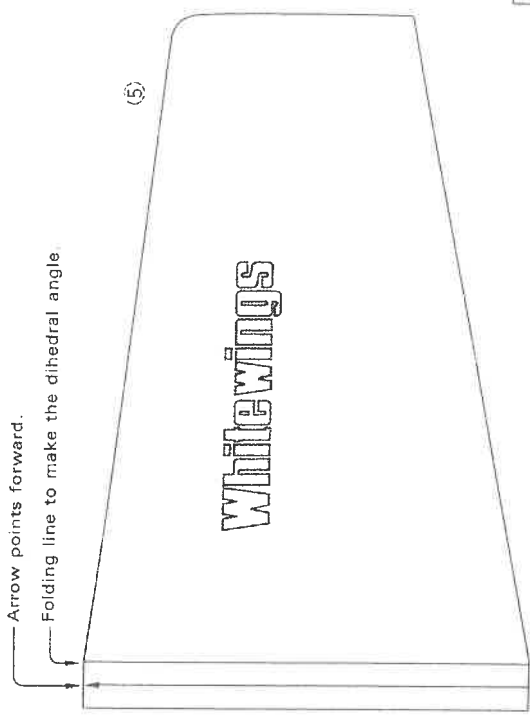
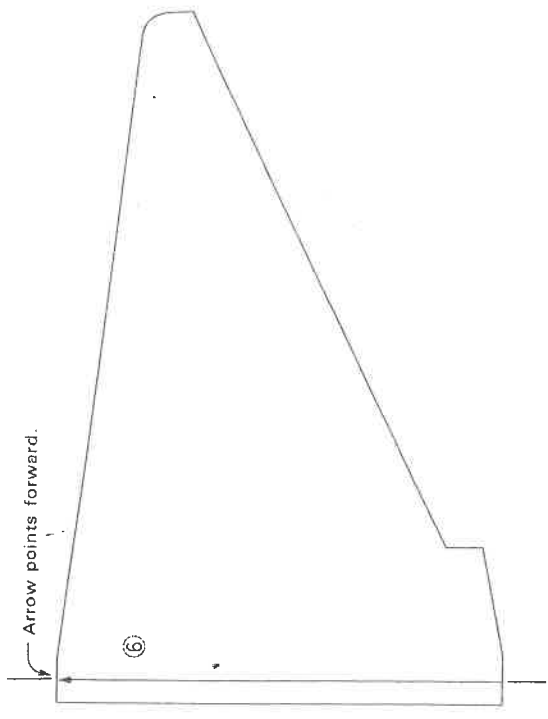
Fold with dashed line inside.
Arrows point forward.



WhiteWings

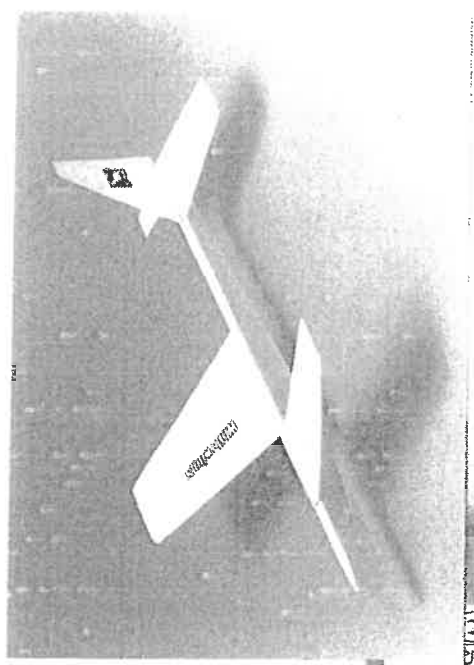
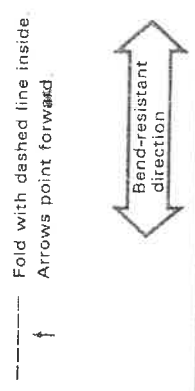
White wings
Racer 525 Sparrow





WhiteWings®

ASYMMETRICAL WING PLANE



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Make firm creases along the dashed lines.
Arrow points forward.

(1)

Make firm creases along the dashed lines.
Arrow points forward.

(2)

Arrow points forward.

(4)

Arrow points forward.

(7)

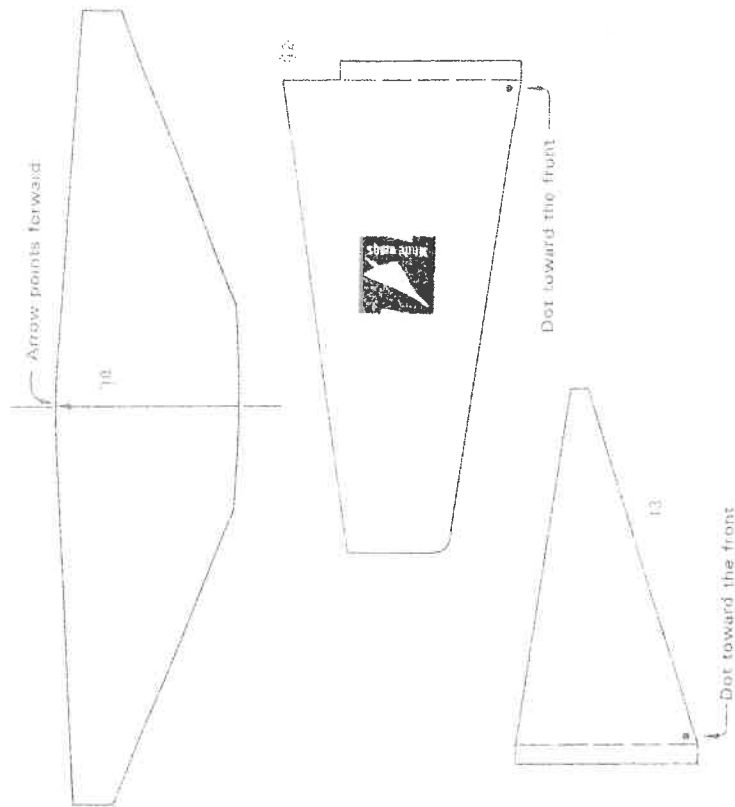
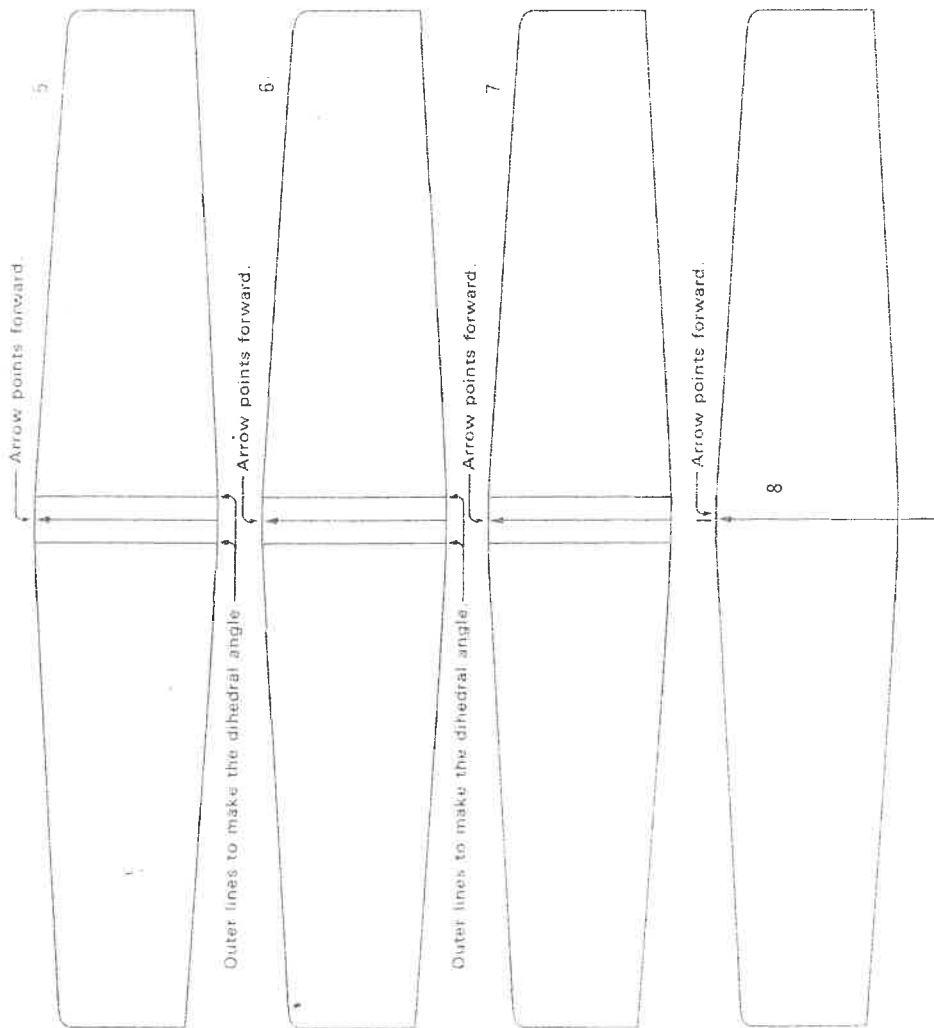
Folding line to make the dihedral angle.

Arrow points forward.

(3)

Cut along the solid lines up to the dashed line.

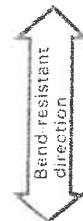




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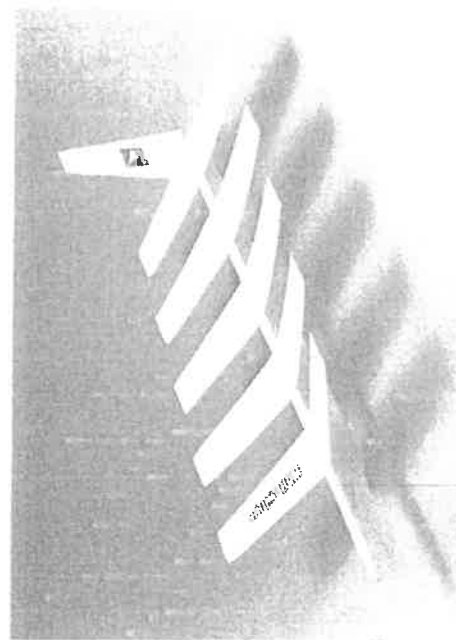
MULTI-TANDEM PLANE

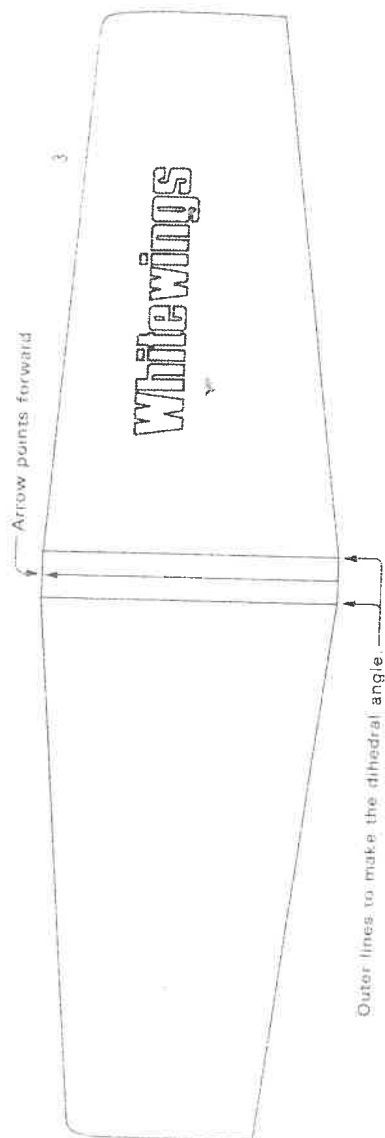
Fold with dashed line inside.
Arrows point forward.



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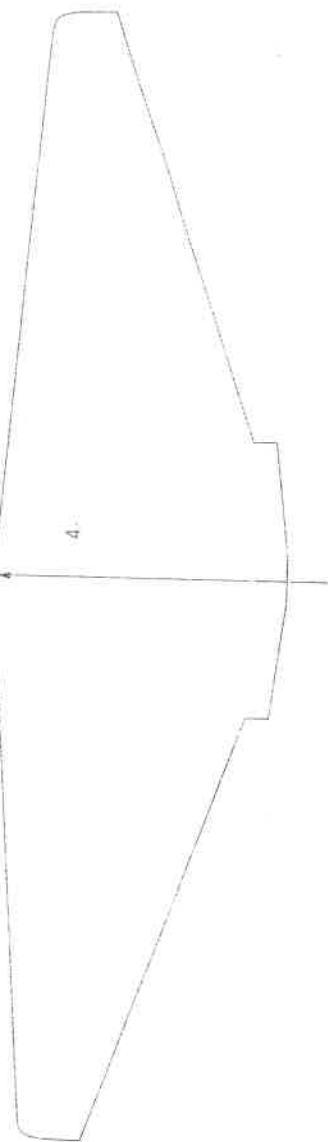
WhiteWings



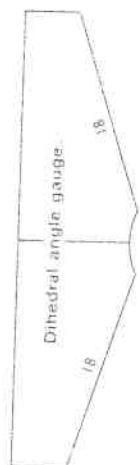


Outer lines to make the dihedral angle.

Arrow points forward.



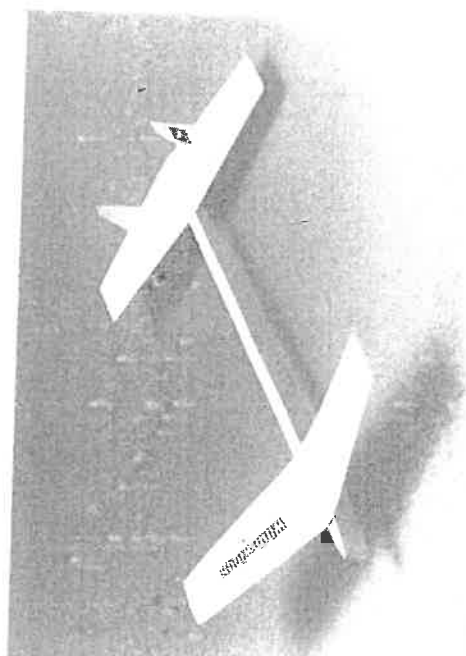
4



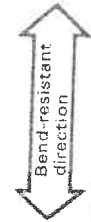
Dihedral angle gauge.

18

18



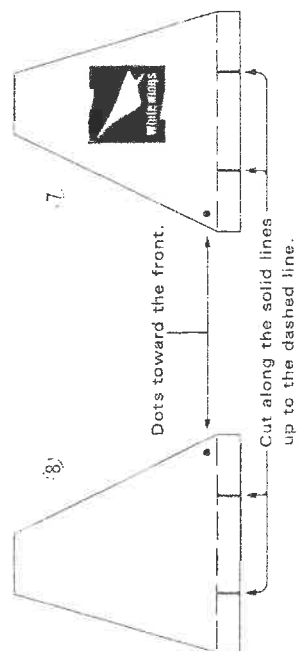
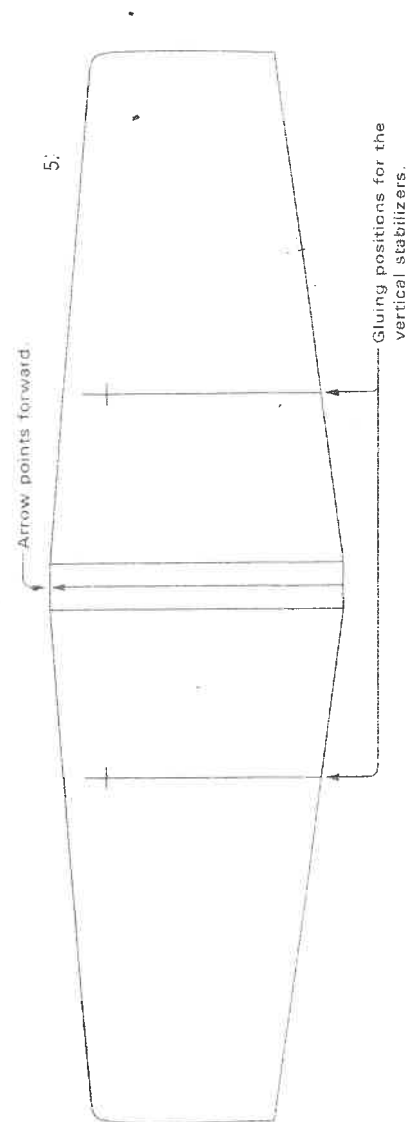
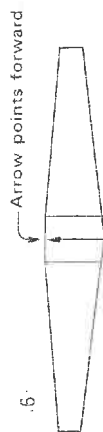
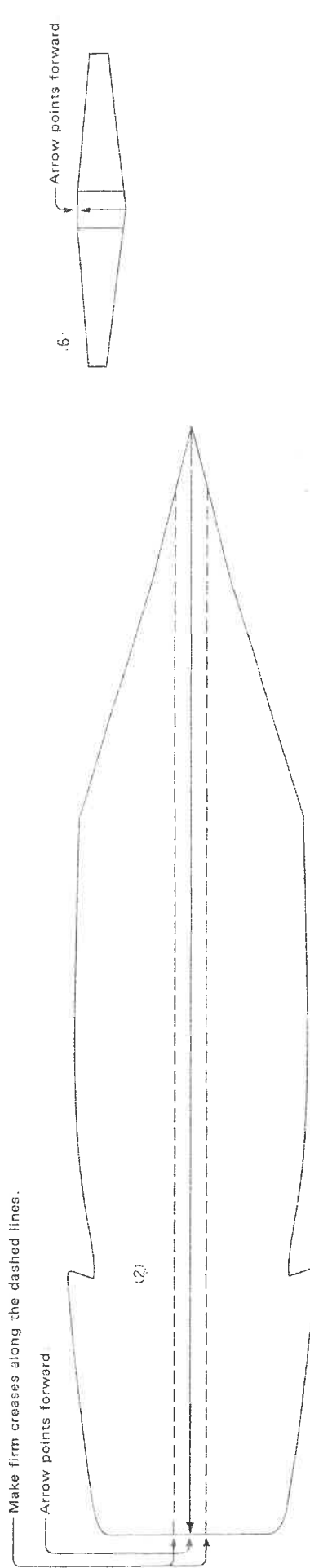
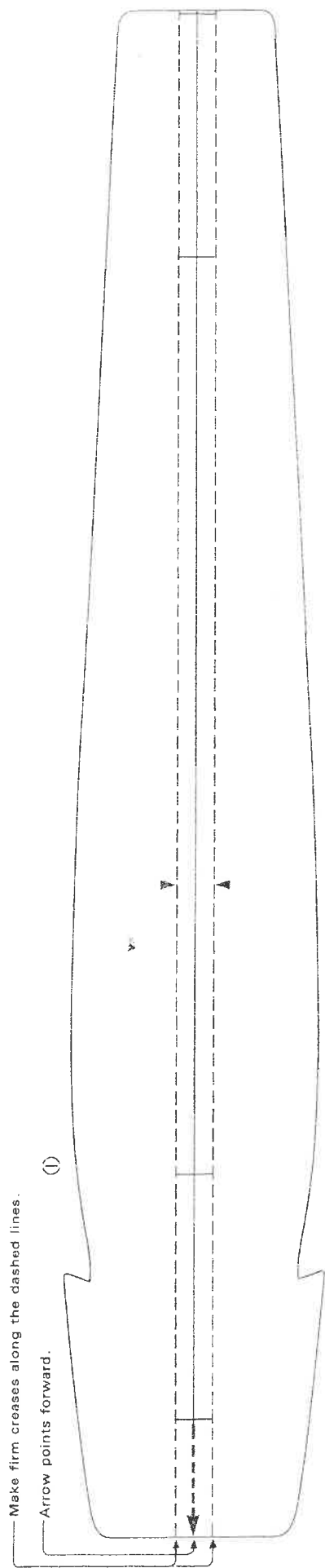
--- Fold with dashed line inside.
↑ Arrows point forward.



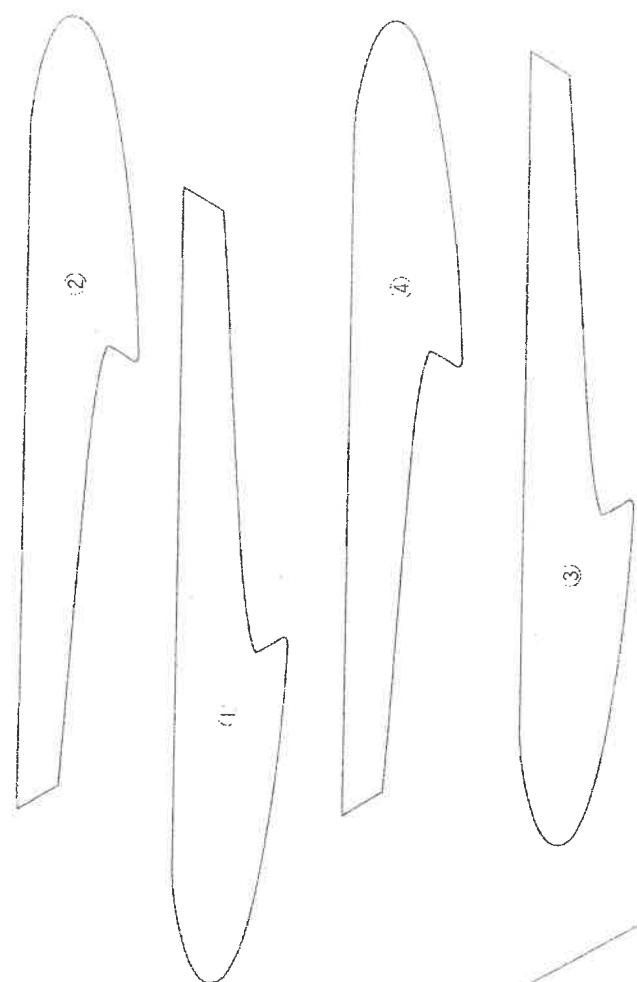
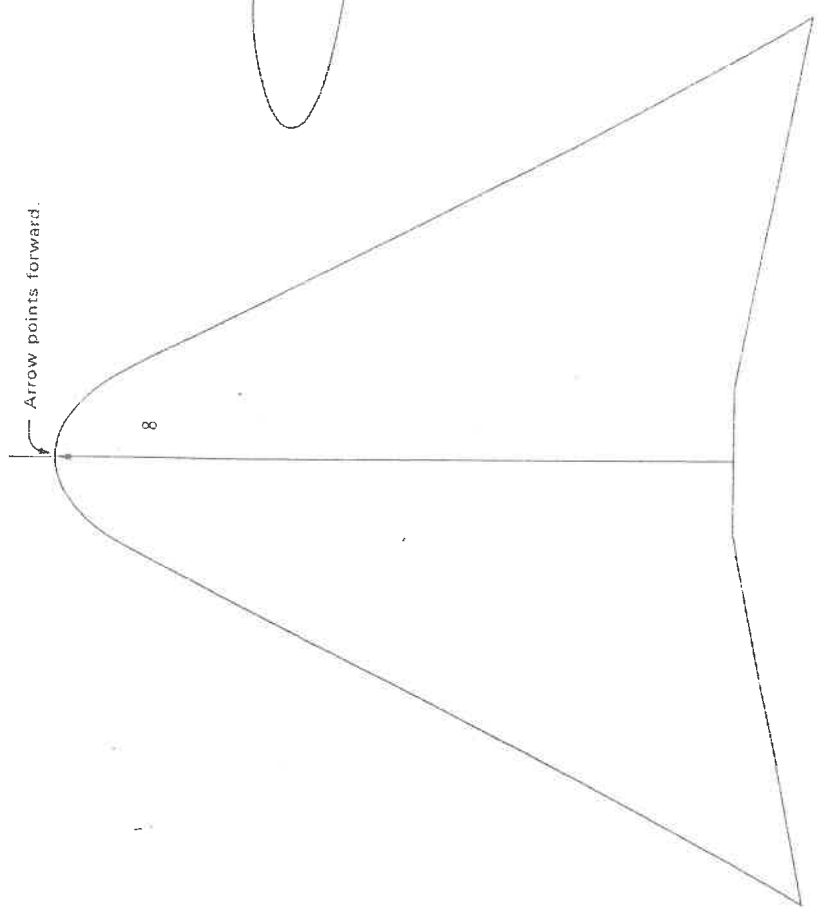
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TANDEM PLANE

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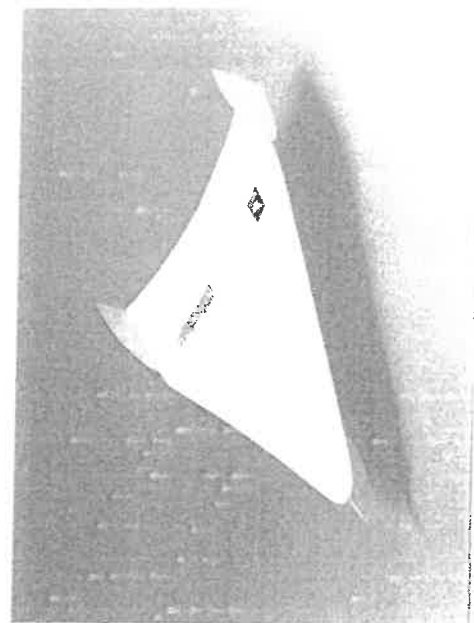
Arrow points forward.



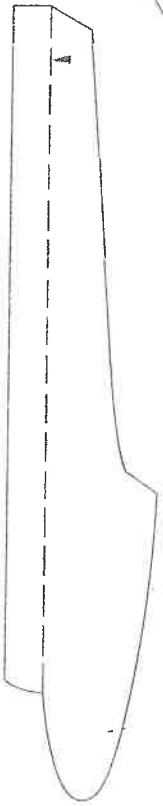
WhiteWings®

DELTA PLANE

--- Fold with dashed line inside
↑ Arrows point forward.



(5)



Cut along the solid lines up to the dashed line.

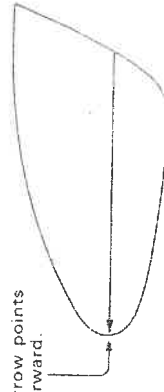
White Wings

(7)

Arrow points forward.

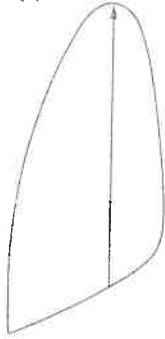
(10)

Arrow points forward.

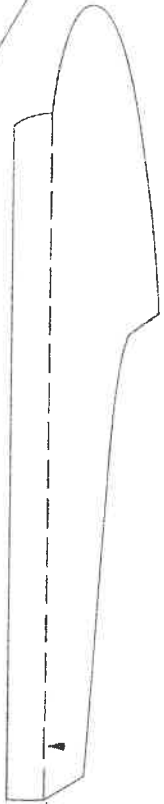


(9)

Arrow point forward.



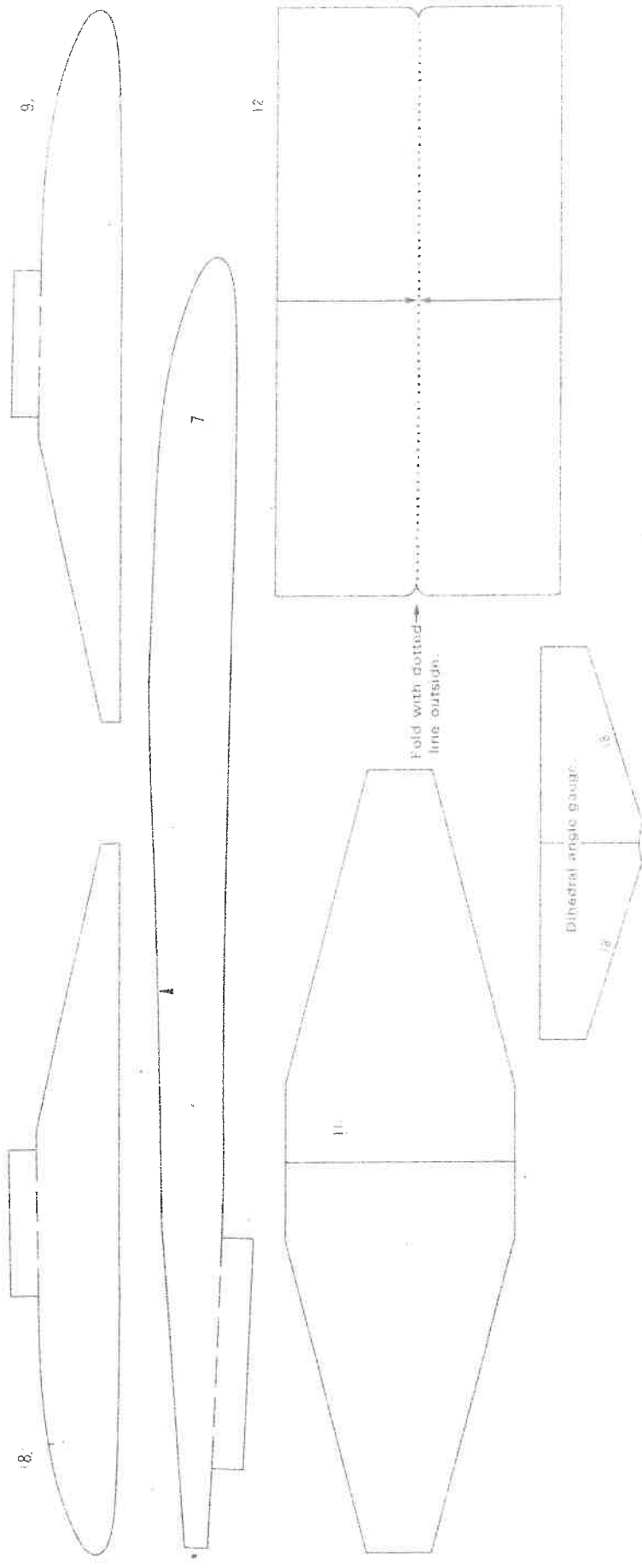
(6)



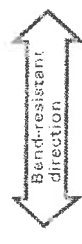
Cut along the solid lines up to the dashed line.



1/4"

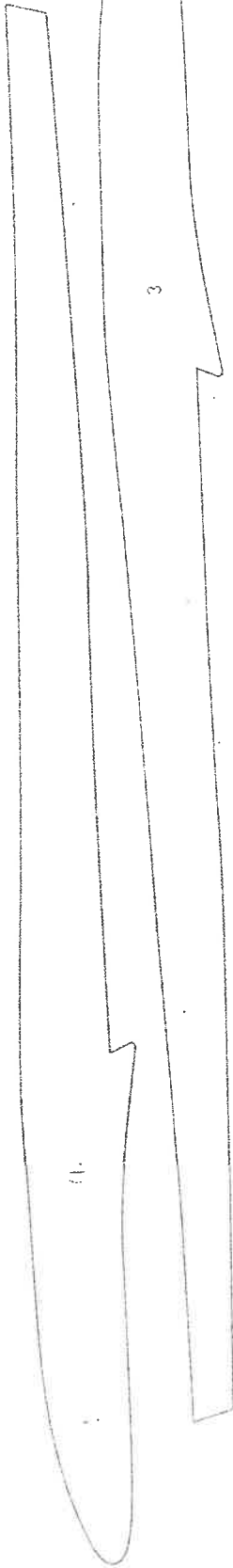


..... Fold with dotted line outside
----- Fold with dashed line inside
↑ Arrows point forward.



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RING WING CANARD



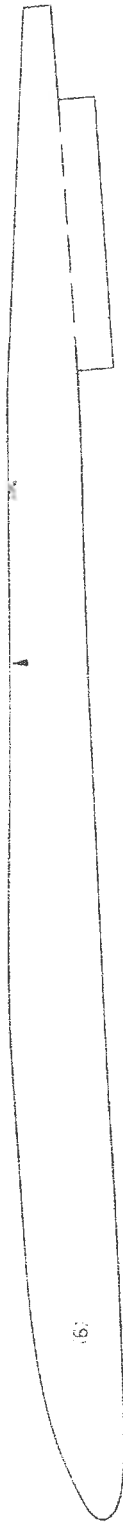
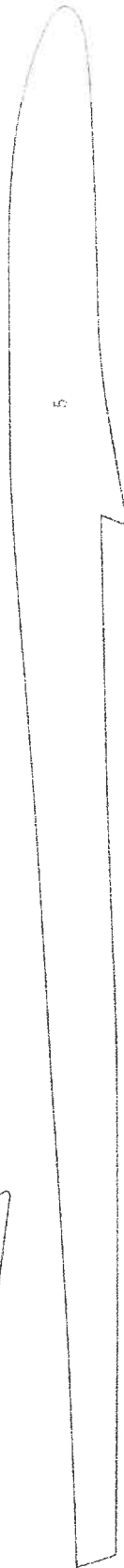
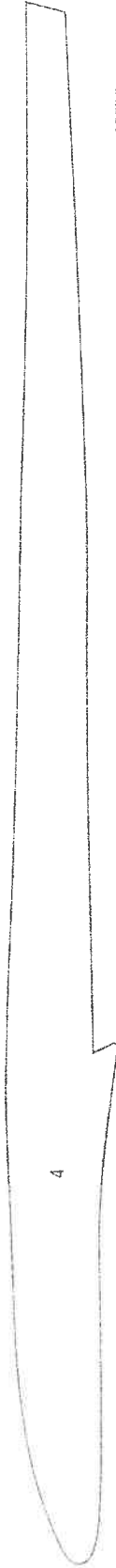
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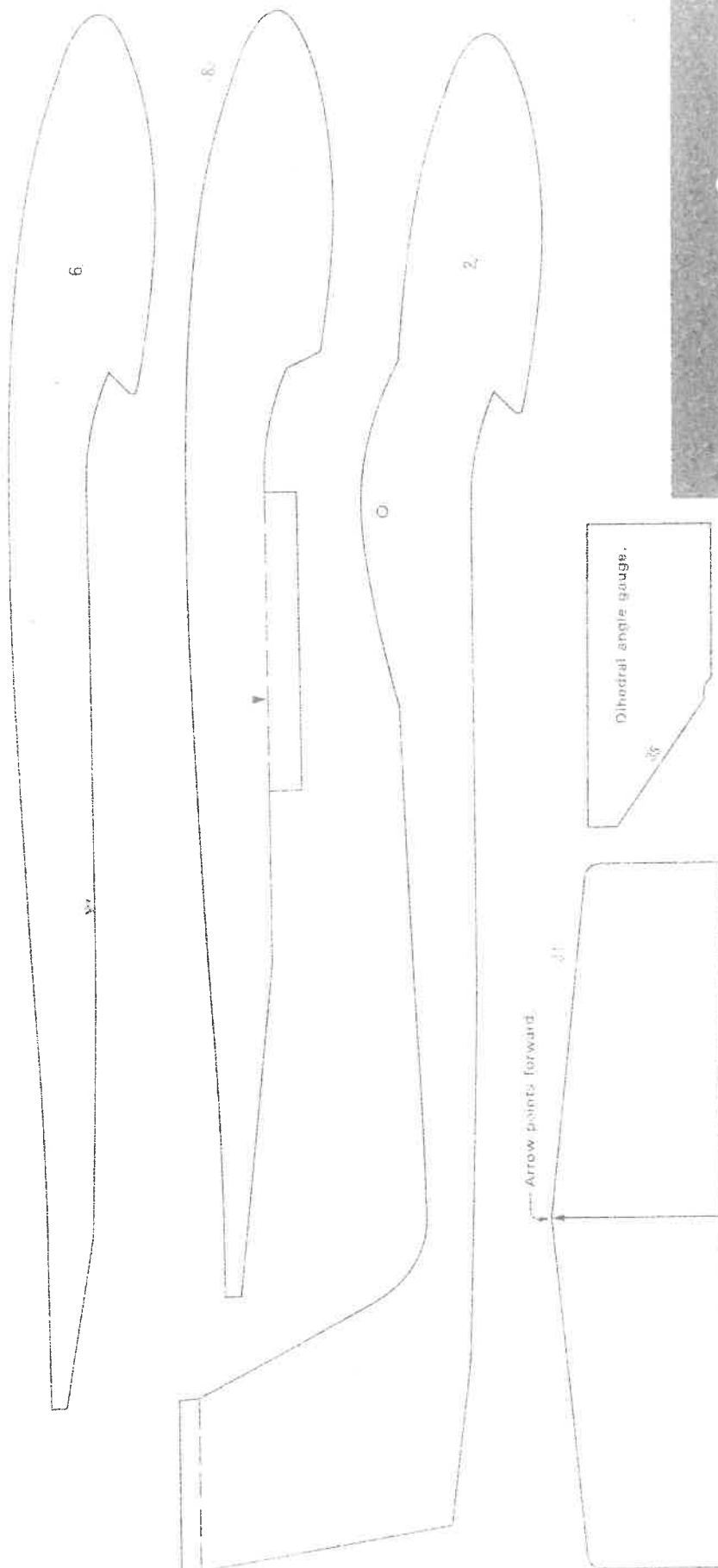


Dot toward the front

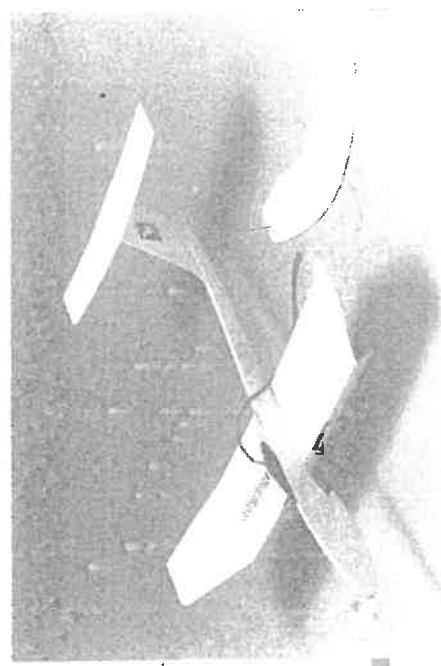
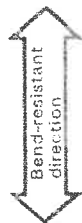
Dot toward the front

STITCHES



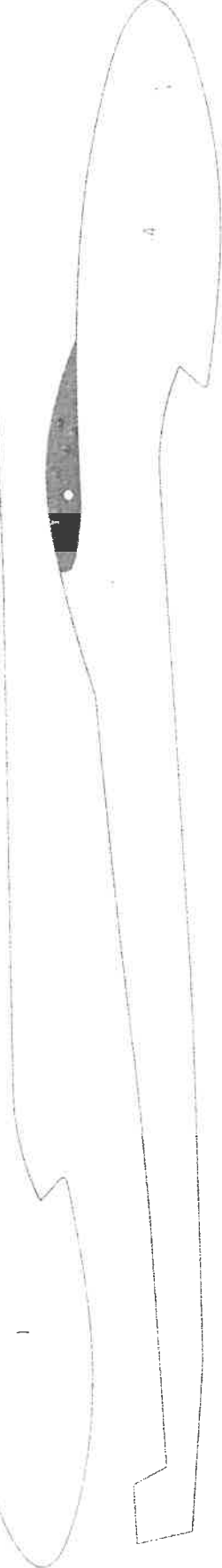
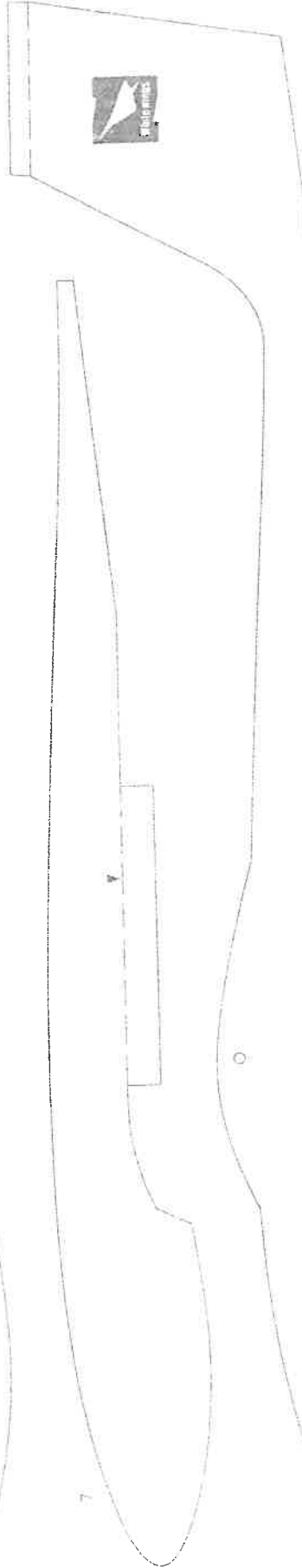
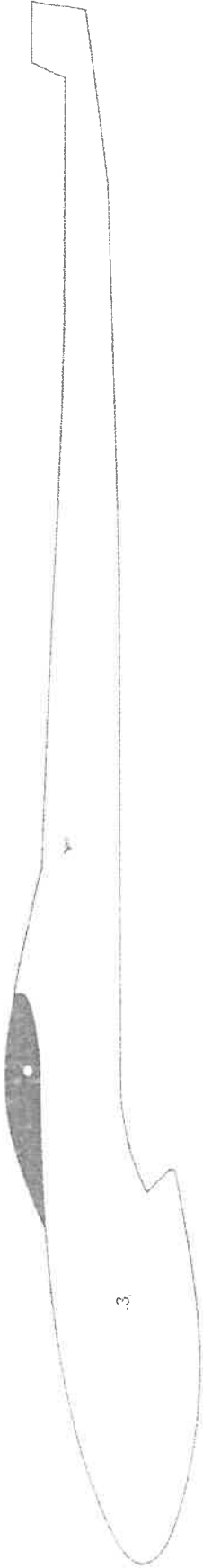


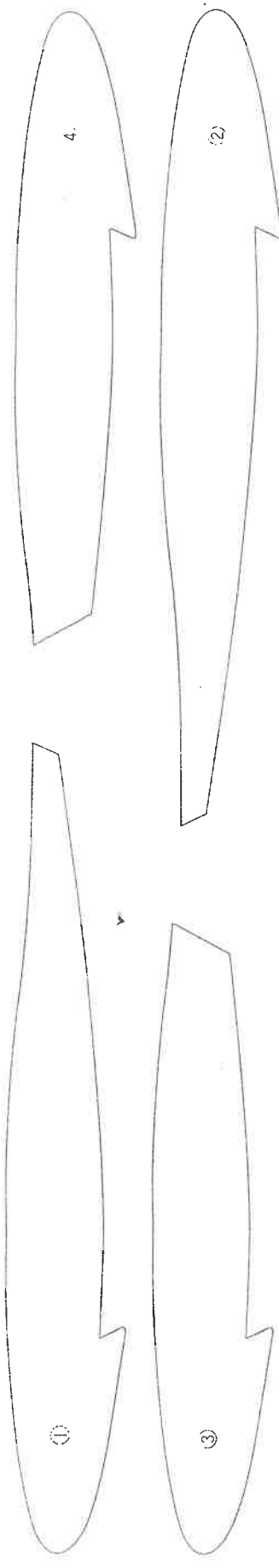
- ... Fold with dotted line outside
- - - Fold with dashed line inside
- ↑ Arrows point forward.



White Wings®

PAIR PLANE

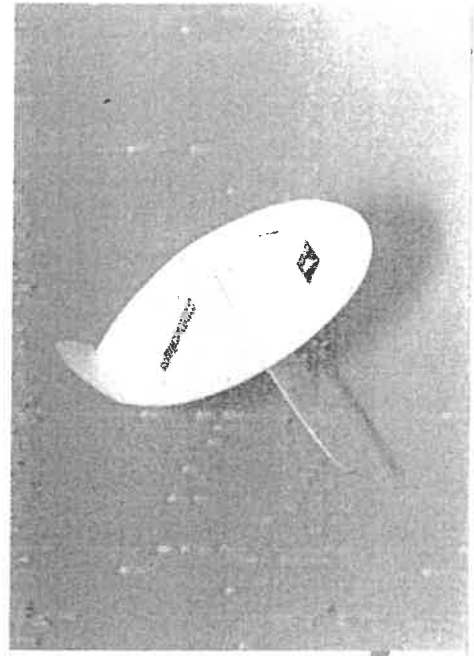


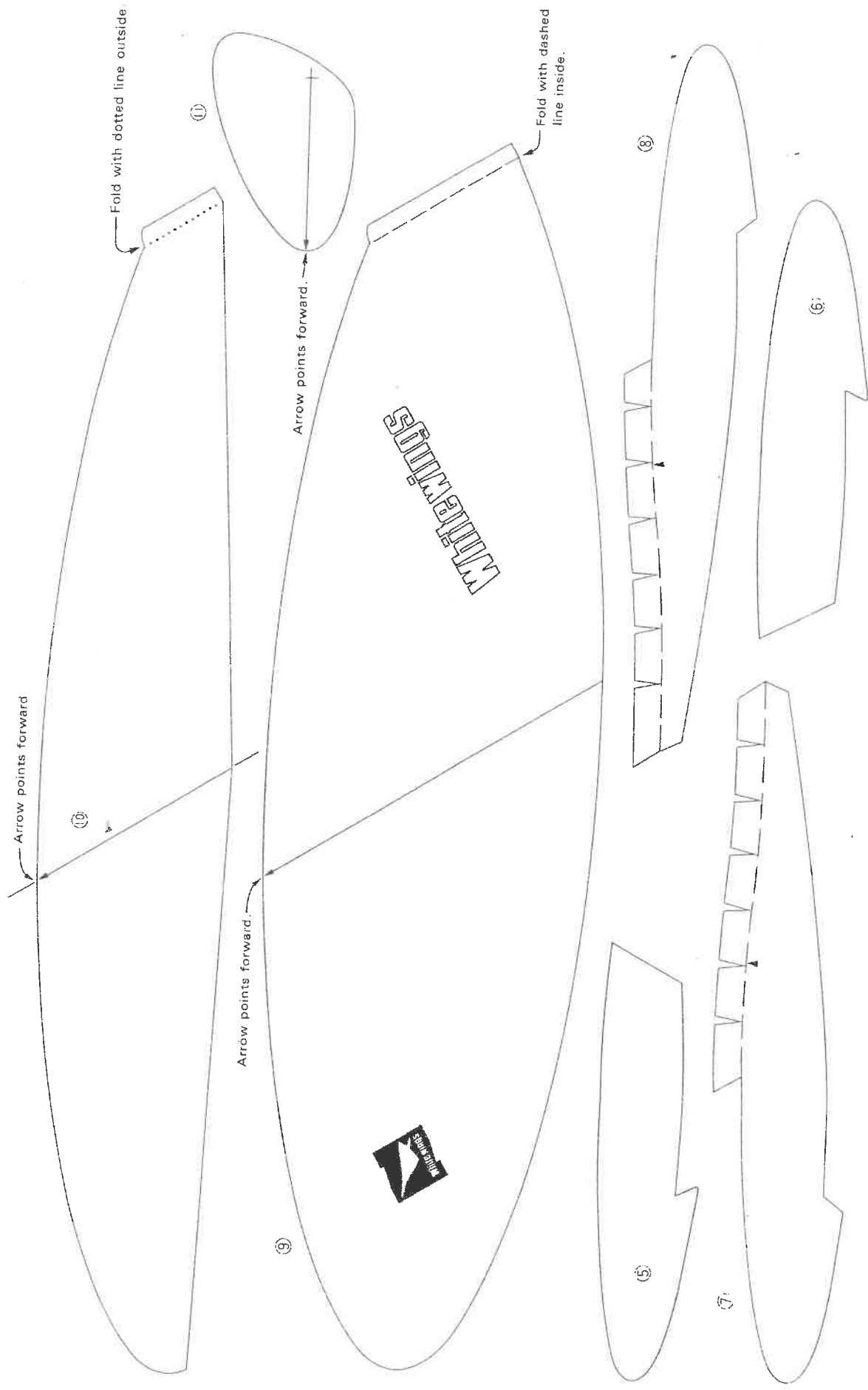


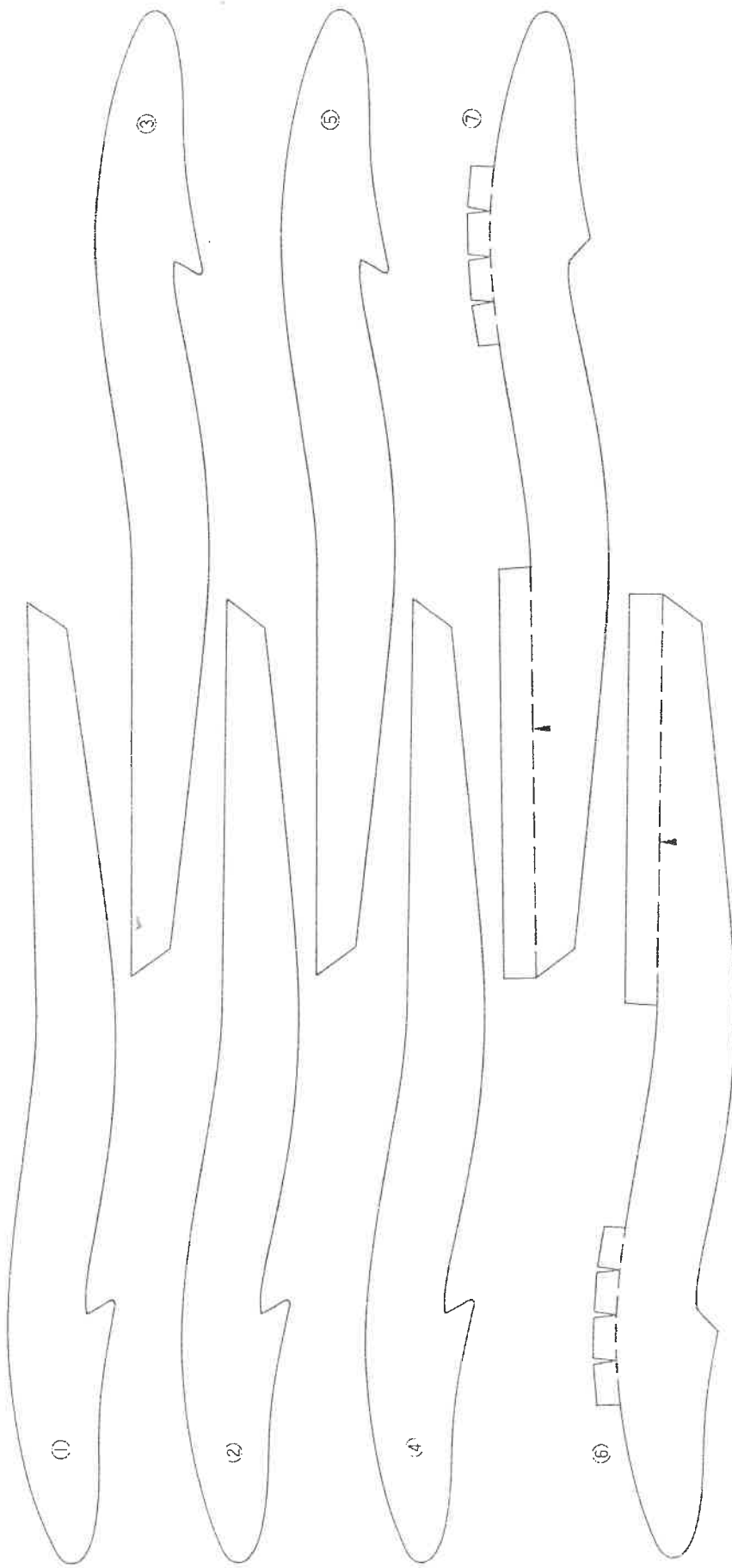
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OBLIQUE WING PLANE

..... Fold with dotted line outside.
 - - - - - Fold with dashed line inside.
 + Arrows point forward.



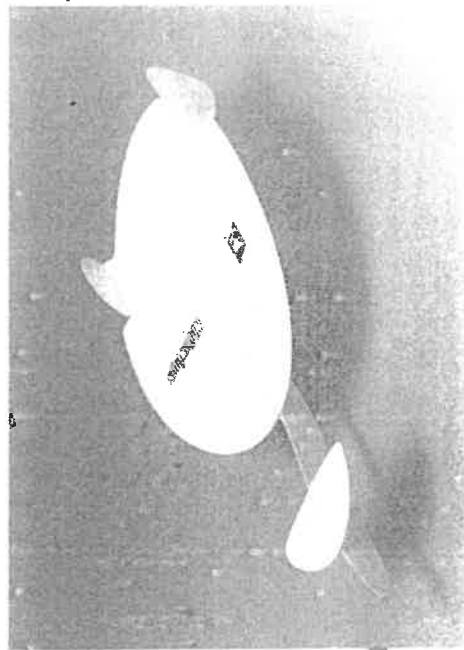
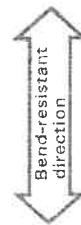


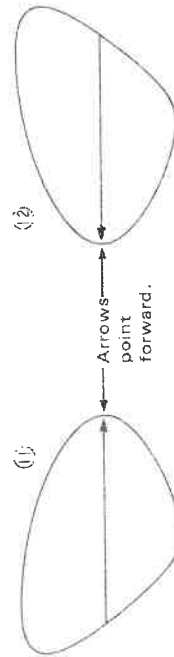
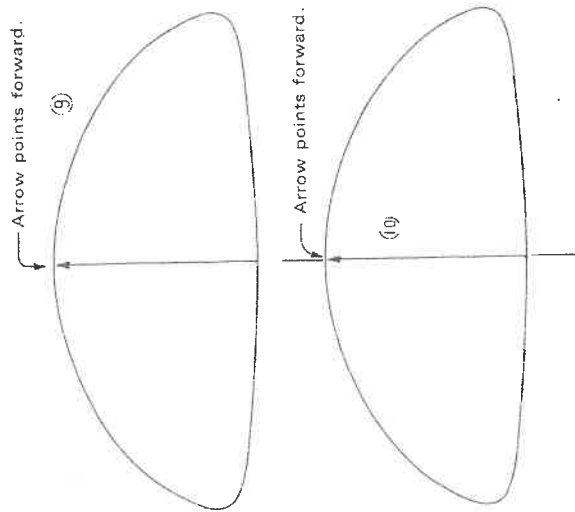
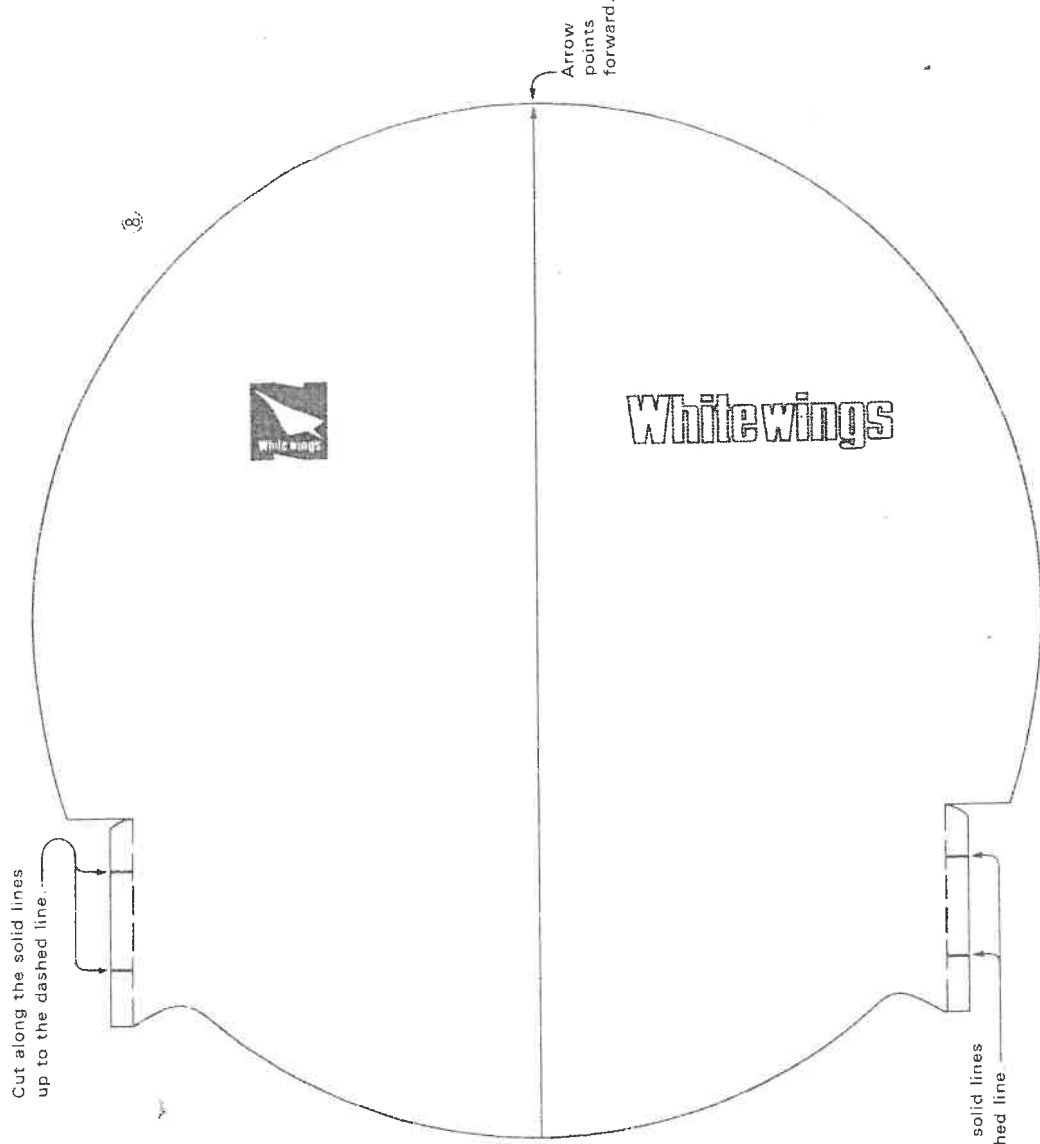


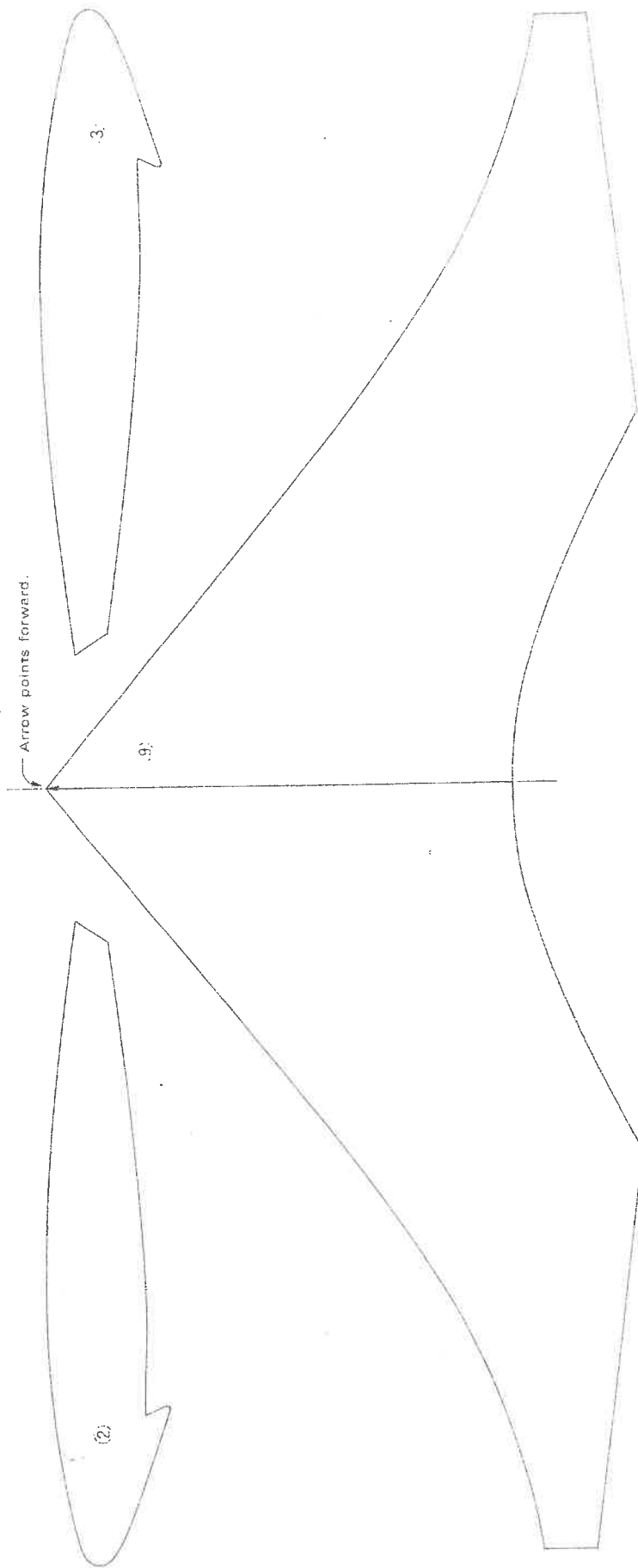
WhiteWings®

CIRCULAR WING CANARD

--- Fold with dashed line inside.
↑ Arrows point forward.



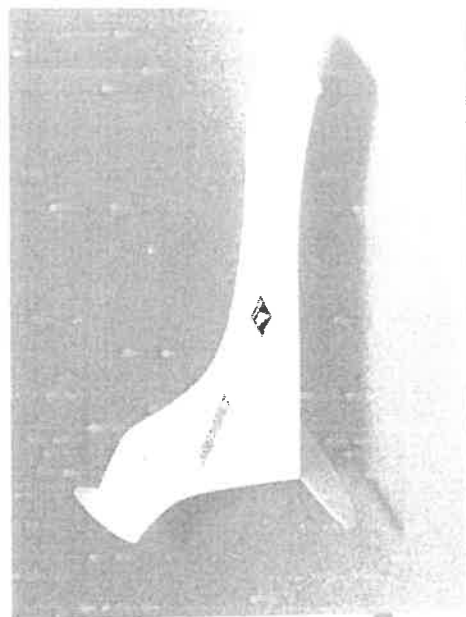
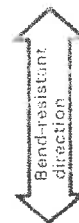




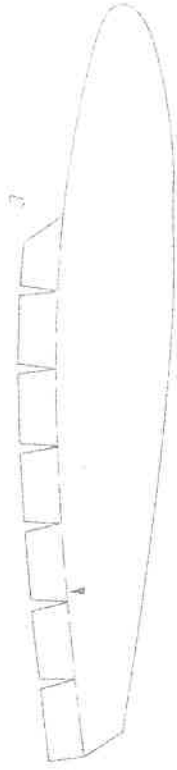
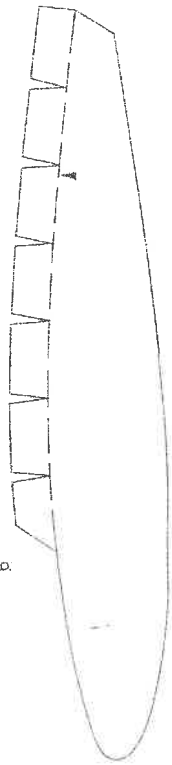
WhiteWings®

TAILLESS PLANE

----- Fold with dashed line inside.
 ↑ Arrows point forward.



6



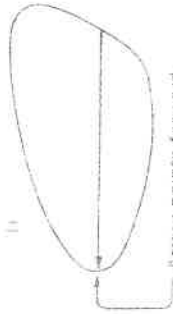
4



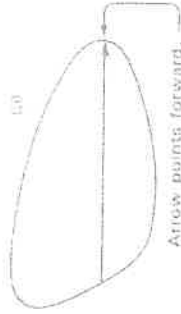
5



10



10



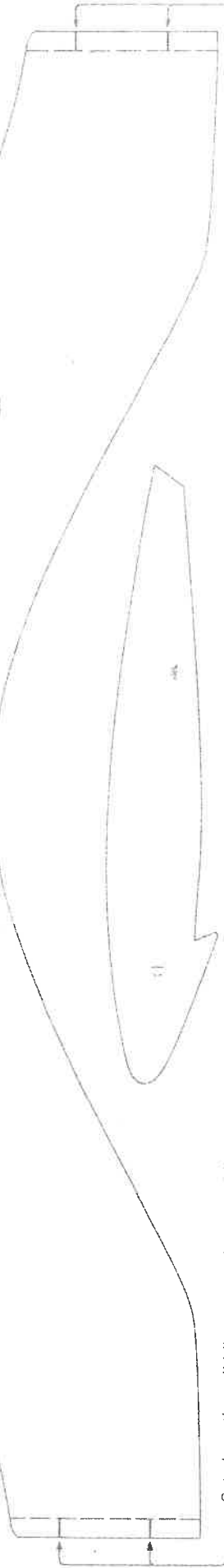
Arrow points forward

Arrow points forward



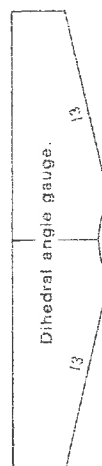
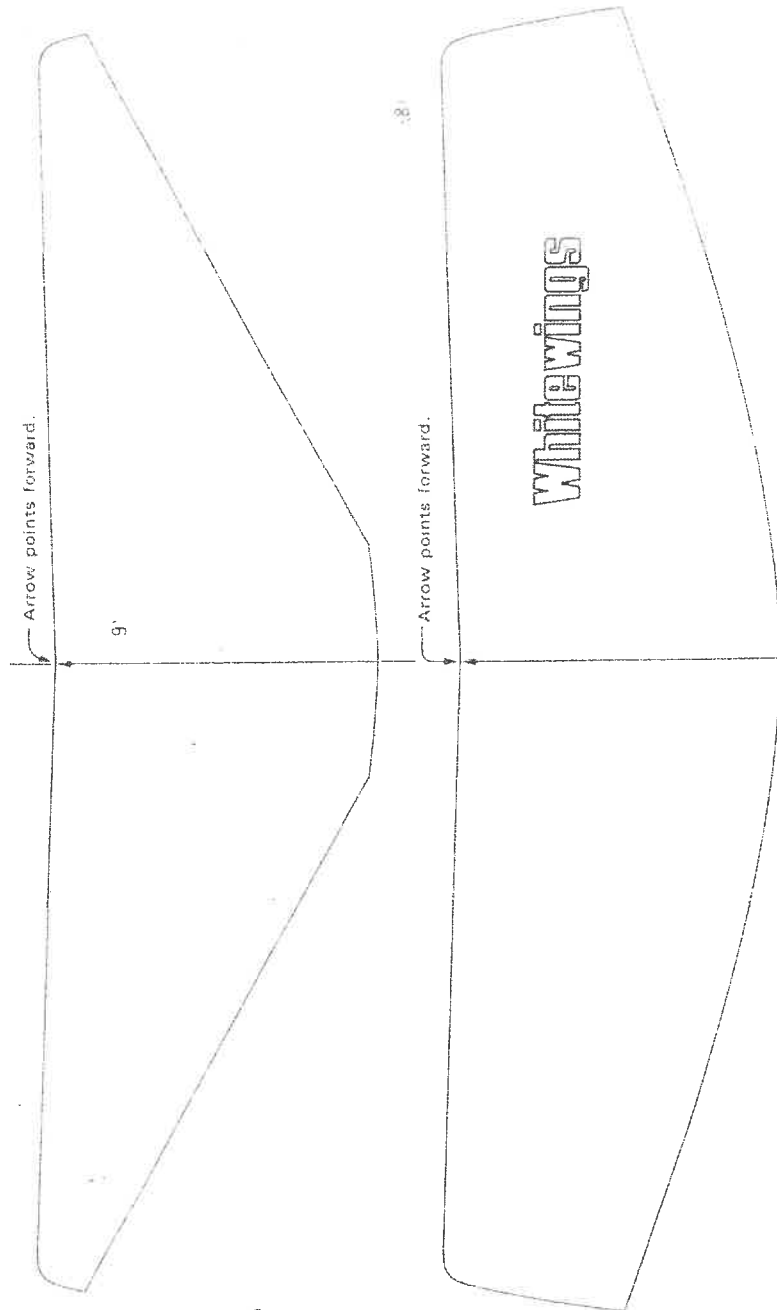
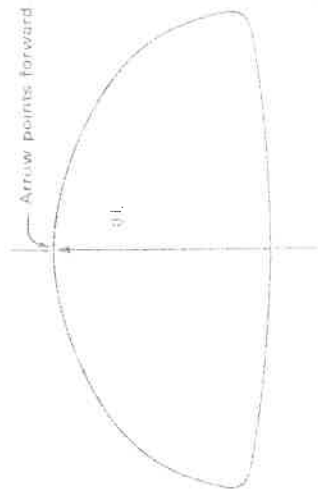
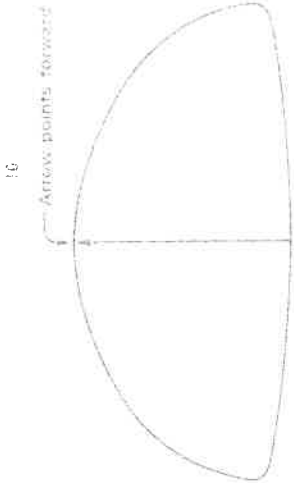
White Wings

8



Cut along the solid lines up to the dashed line

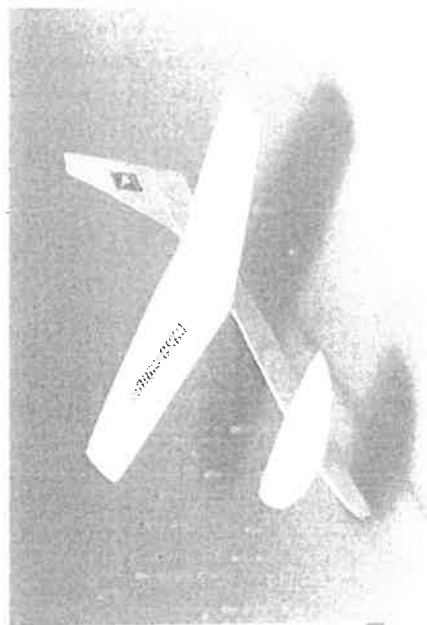
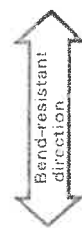
Cut along the solid lines up to the dashed line



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CANARD

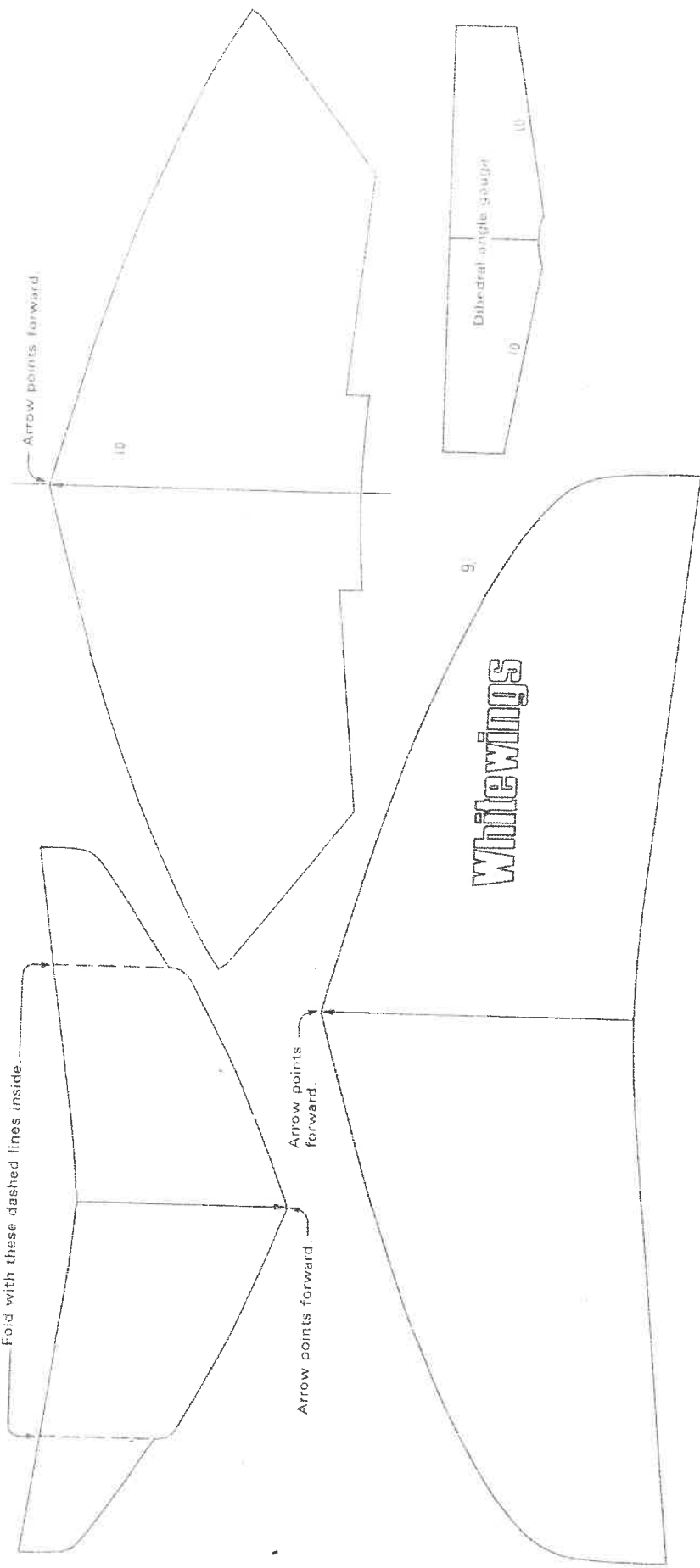
--- Fold with dashed line inside.
+ Arrows point forward.





11

Fold with these dashed lines inside.



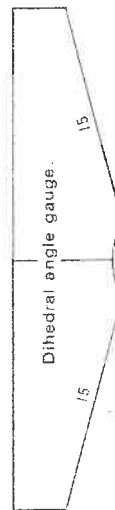
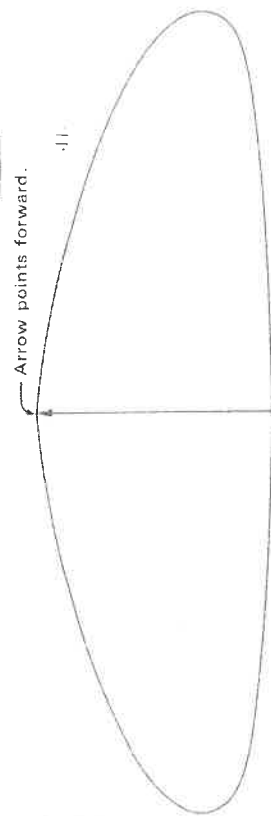
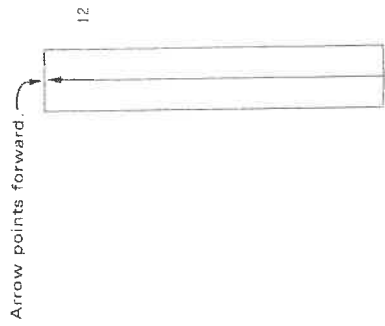
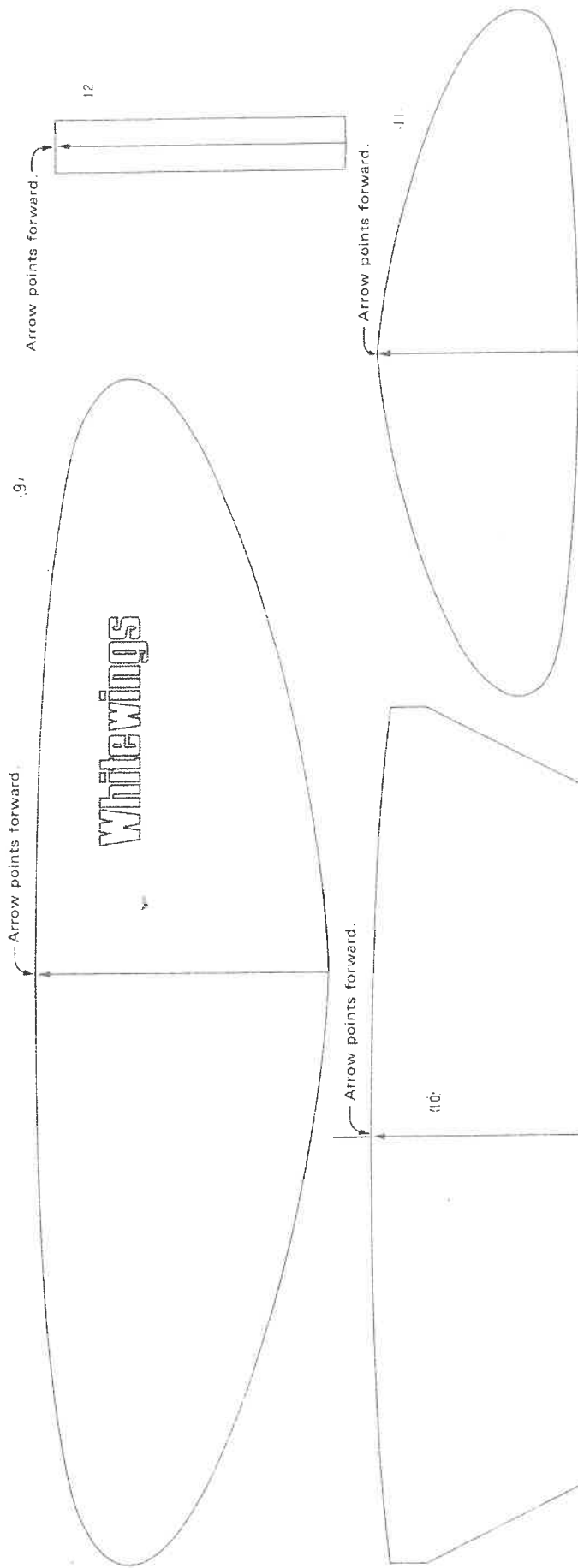
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Racer 526 King Fisher

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--- Fold with dashed line inside.
↑ Arrows point forward.

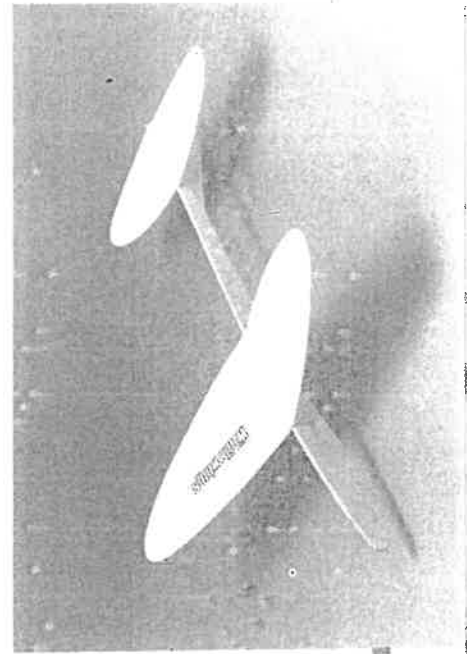


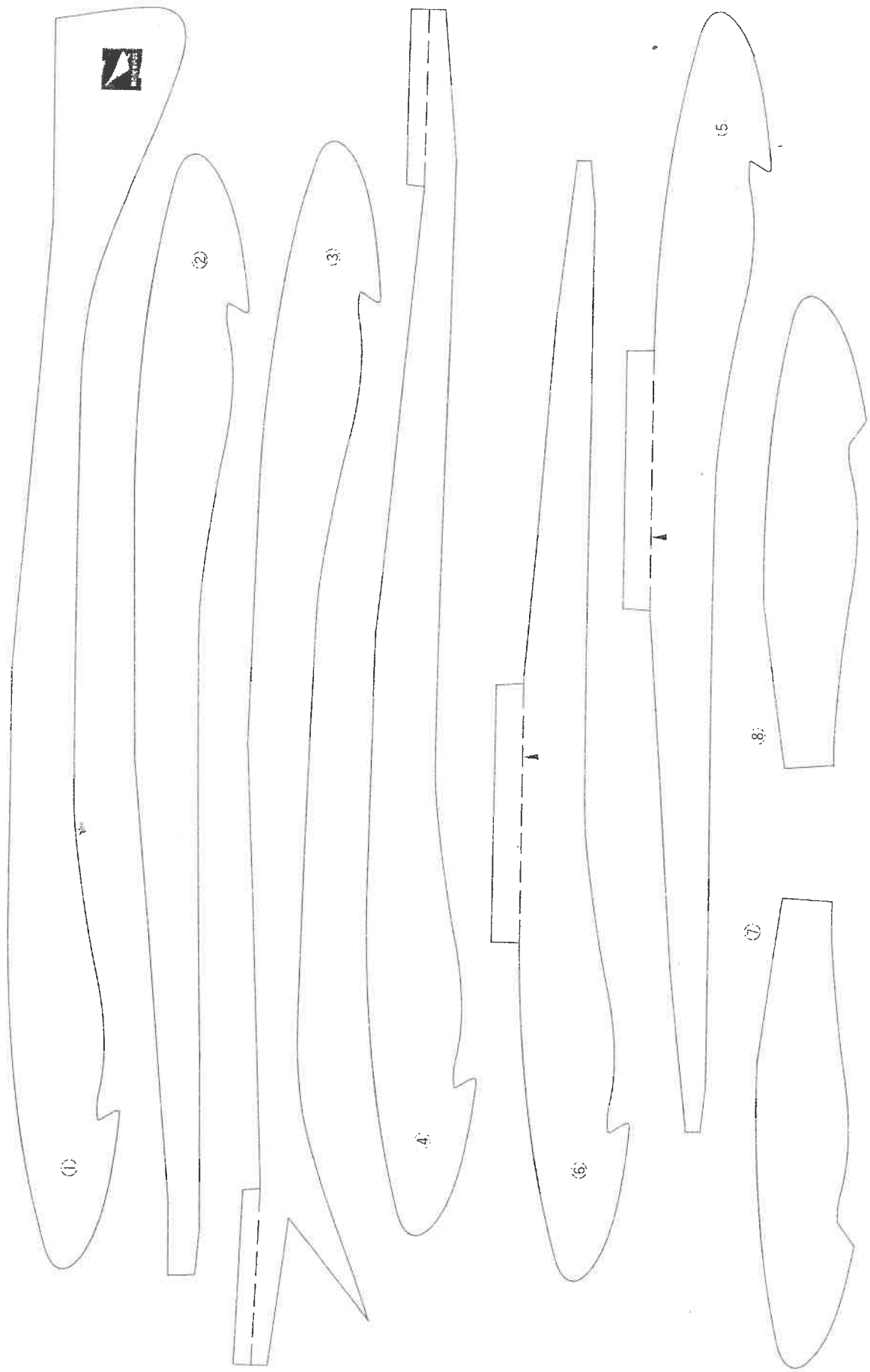


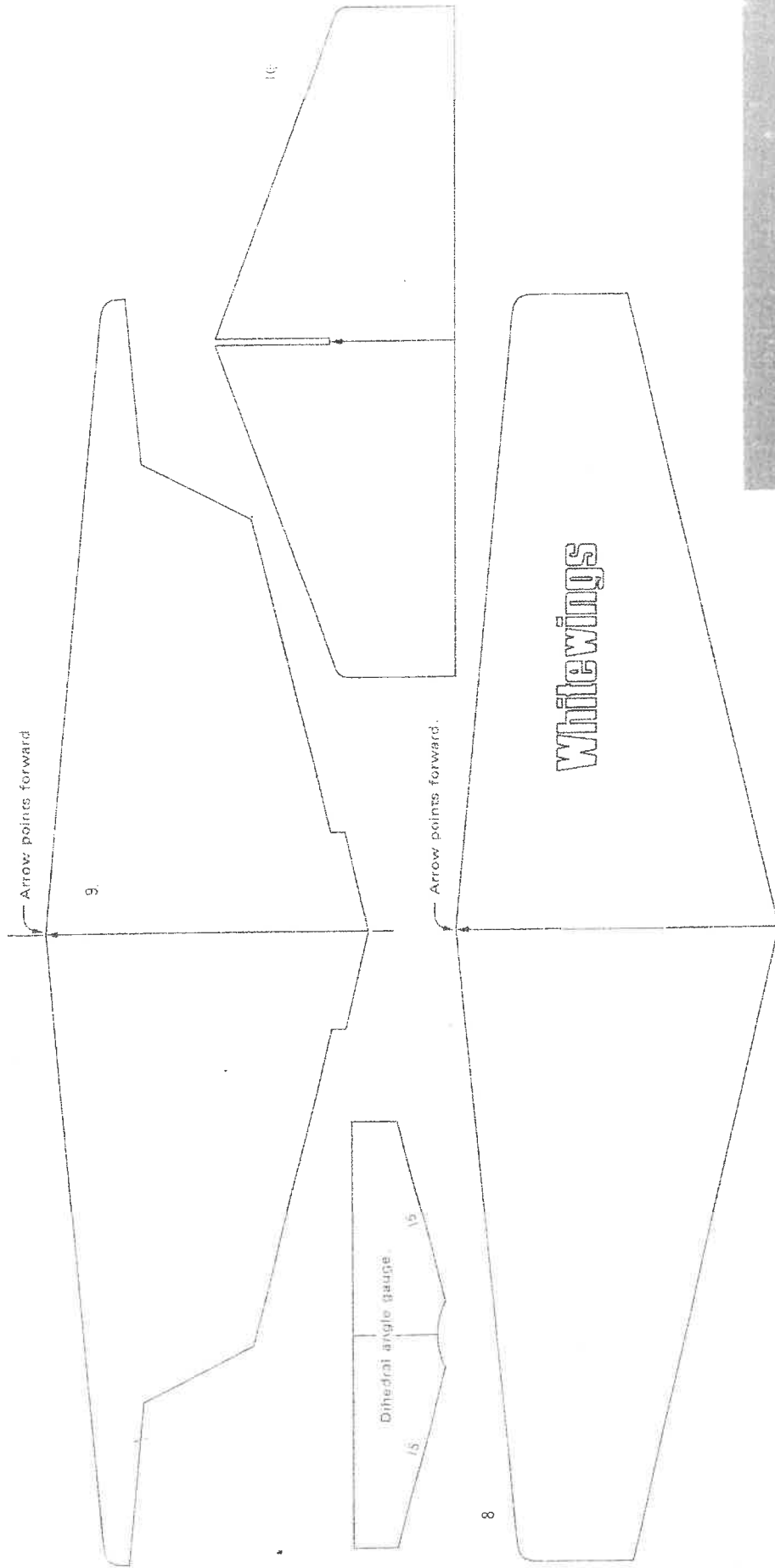
WhiteWings®

Racer 525 Sparrow

--- Fold with dashed line inside.
↑ Arrows point forward.



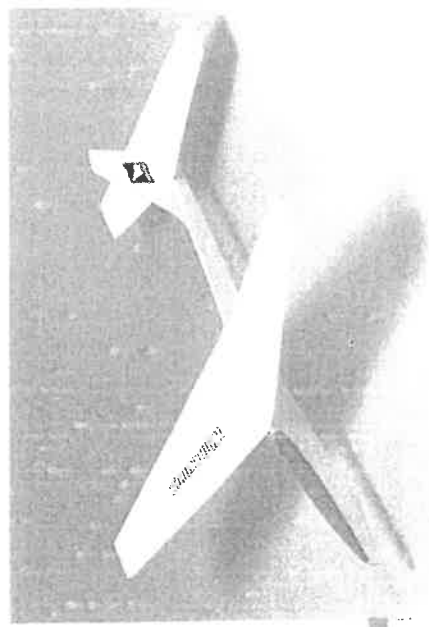
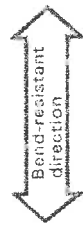


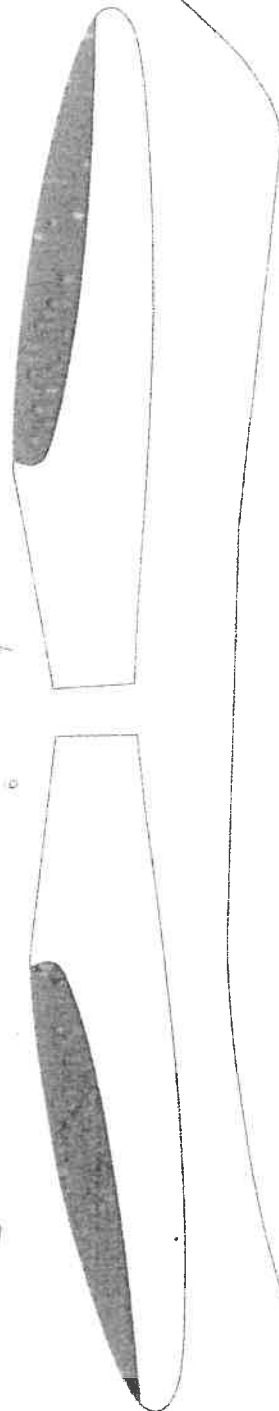
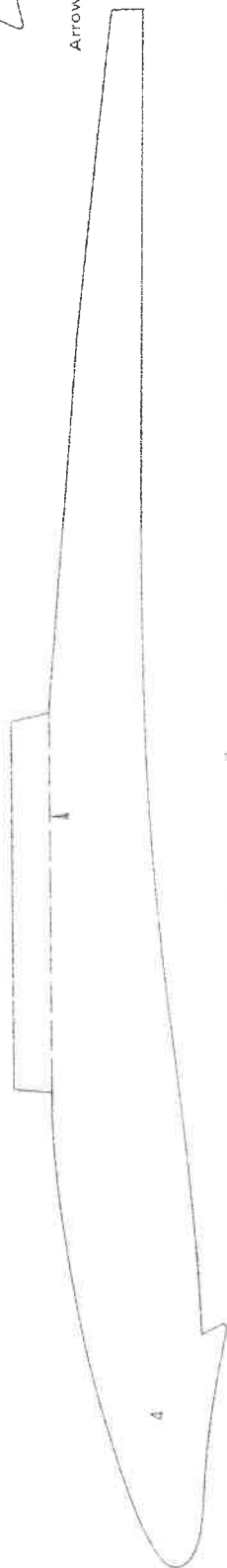
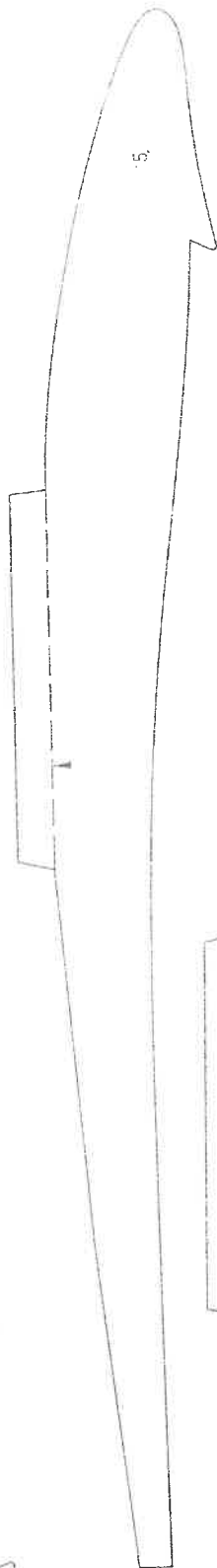


WhiteWings®

Racer 524 Blue Jay

--- Fold with dashed line inside
↑ Arrows point forward





Arrow points forward

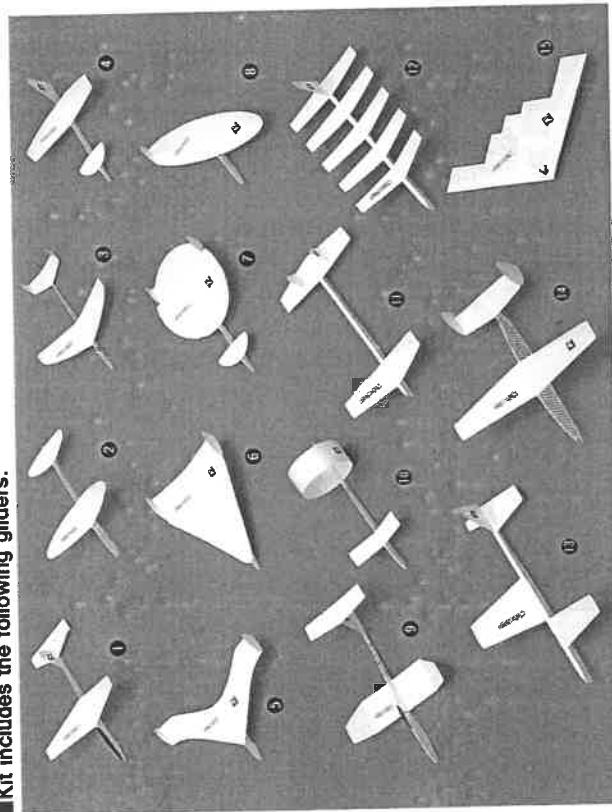


- 1 Racer 524 Blue Jay
- 2 Racer 525 Sparrow
- 3 Racer 526 King Fisher
- 4 CANARD
- 5 TAILLESS PLANE
- 6 DELTA PLANE
- 7 CIRCULAR WING CANARD
- 8 OBLIQUE WING PLANE
- 9 PAIR PLANE
- 10 RING WING CANARD
- 11 TANDEM PLANE
- 12 MULTI-TANDEM PLANE
- 13 ASYMMETRICAL WING PLANE
- 14 PANORAMA PLANE
- 15 Northrop B-2 Stealth bomber

■ **Instruction booklet**
(68 pages)
Assembly, flight,
and design directions

■ **Also included:**
Rubber band
Catapult
(GLUE NOT INCLUDED)

■ **Kit includes the following gliders:**



■ **FLYING FUN FOR EVERYONE**

When you fly your plane please keep the following in mind.

- *Launch your plane in a large area away from people who might get hit.
- *Don't fly your plane where cars will be passing by.



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Used Very Good -
Whitewings: 15 Excellent
Paper Airplanes (Assembly
kit) (Future of Flight)

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